GETTING REDD-Y
Conservation and Climate Change in Latin America

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Abstract: Deforestation in Latin America, especially in the Amazon basin, is a major source of greenhouse gases such as carbon dioxide that contribute to global warming. Protected areas play a vital role in minimizing forest loss and in supplying key environmental services, including carbon sequestration and rainfall regulation, which mitigate the adverse impacts of climate change amid a rising tide of economic development in the region. The area of protected forest has expanded rapidly since 1980 to cover one-fifth of Latin America and more than two-fifths of Amazonia, a region whose rain forest captures some 40 percent of Latin America's carbon emissions. The reserve sector has traditionally suffered from severe underfunding, but the possibility of new resources being generated through financial compensation for "reduced emissions from deforestation and forest degradation" (REDD) or "avoided deforestation" under a new Kyoto protocol after 2012 could help strengthen the environmental and social roles of protected areas. However, a number of major implementation and governance challenges will need to be addressed.

TROPICAL FORESTS AND ENVIRONMENTAL SERVICES

The importance of preserving natural resources for societal benefit has long been recognized. Modern concern for nature conservation emerged in the nineteenth century in Europe; the United States; and in British colonies in southern Africa, Australia, and New Zealand with the establishment of nature reserves and national parks (Adams 2008). From being considered primarily the guardians of scenic beauty and as a source of leisure, protected areas are now also recognized as major suppliers of ecosystem services. These have been classified into four major categories: supporting, regulating, provisioning, and cultural services (World Wildlife Fund [WWF] 2009; Ferraro and Kiss 2002; Daily 1997). Basic supporting services involve biodiversity conservation, soil formation, and water cycling. Regulating services relate to climate, hydrology, nutrient retention, carbon sequestration, and fire control, among others. Provisioning involves the supply of timber and nontimber forest products; cultural services embrace nonuse values, as well as landscape beauty for recreation and tourism purposes.

Although these services are all ultimately linked and interdependent, in the fight against global warming, carbon sequestration is particularly critical in

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relation to conservation. Tropical forests are currently net absorbers of carbon dioxide (CO_2), a major greenhouse gas (GHG), but this function is increasingly threatened by growing deforestation and forest degradation, which account for about one-fifth of the world's GHG emissions, second only to fossil fuels. Furthermore, carbon sequèstration is the only ecosystem service for which there is an emerging world market that might be harnessed to combat global warming.

Another major environmental service is rainfall regulation. The Amazon rain forest, for example, emits 8 trillion tons of water into the atmosphere and is critical for agricultural, industrial, and urban development over large swaths of South America, not to mention its more general implications for global climatic stability. Scientific evidence points strongly to a marked link between anthropogenic change such as deforestation and increased vulnerability to drought and forest fires (Aragão et al. 2008; Barlow and Peres 2008). Controlling forest loss and use of fire through appropriate conservation strategies is therefore an important means of mitigating climate change, and one over which, in principle at least, policy makers retain some control.

To these physical environmental services can be added the maintenance of social diversity. Small producers settling the Amazon have often been cast as villains and destroyers of the environment, driven by land hunger and poverty. This is true in some measure, but the creation of such stereotypes has often been a political tactic of large commercial interests to discredit small settlers and to monopolize government subsidies (Bourne 1978; Wood and Schmink 1978; Hall 1989). It is increasingly being recognized that local indigenous, traditional, and even colonist rain forest populations can, given favorable circumstances and appropriate incentives, play key environmental roles as guardians of the forest and by promoting nondestructive practices and forms of resource use that contribute to sustaining livelihoods (Hall 1997).

Amazonia occupies a central position in this discussion. The nine Amazon countries have lost a total of almost 1 million square kilometers of forest, or around 16 percent of their original cover (WWF 2009). According to the Food and Agriculture Organization, between 1990 and 2005 Amazonia, the world's largest remaining area of tropical rain forest, was responsible for 26 percent of global annual deforestation. Furthermore, high average Amazon forest carbon densities "make this figure translate into 46 percent of related global carbon emissions" (Ebeling and Yasué 2008, 1917). Brazilian Amazonia experienced an annual forest loss during 1990–2005 of 2.8 million hectares, or more than ten times that of its closest Latin American rivals, Venezuela and Bolivia (based on FAO figures, qtd. in Ebeling and Yasué 2008, 1918). Brazil accounts for 5 percent of global GHG emissions, the world's fourth-largest polluter after China, the United States, and Russia (UN Framework Convention on Climate Change [UNFCCC] 2005, 2008). About three-quarters of Brazil's emissions are due to deforestation and land-use change, largely in the Amazon.

In Brazil's Legal Amazon,[1] around 17 percent of the forest has been clear-felled.

1. The Legal Amazon comprises the nine states of Pará, Amazonas, Mato Grosso, Rondônia, Acre, Tocantins, Roraima, Amapá, and Maranhão, and covers an area of 5 million square kilometers, or 58

It has been estimated that by 2030 as much as 55 percent of Brazil's Amazon rain forest will be adversely affected by clearing, logging, drought, and fragmentation, thus generating a regional average temperature rise of up to four degrees Celsius and a reduction in rainfall by as much as 20 percent. Once past this tipping point, a spiral of "savannization" and forest dieback could be unleashed, with severe consequences for the country, the continent, and possibly the world (Instituto Nacional de Pesquisas Espaciais 2007; Nepstad et al. 2008). A vicious circle could thus be created; not only will deforestation seriously exacerbate the process of climate change, but global warming will in turn accelerate rain forest loss.

Deforestation levels are certainly not high in general in Latin America compared with Indonesia and West Africa, although rates vary by country and over time. High rates of forest destruction prompted the Brazilian government to implement a more systematic plan to combat Amazon deforestation and to introduce crackdowns on illegal logging.[2] These measures have been officially credited with playing a major role in reducing aggregate deforestation rates in Brazil's Amazon region by 47 percent over the period 2005–2010. It remains a moot point, however, whether this was principally due to government controls or to other factors, such as falling international demand for commodities such as soya, beef, and timber during an economic recession. Historically, macroeconomic factors have been far more significant in determining deforestation rates than environmental policies (Fearnside 2005). Be that as it may, however, where the wider economic context actively stimulates deforestation, frustrating attempts at environmental regulation, expanding protected areas as a bulwark against the growing tide of forest destruction has acquired renewed poignancy.

Whatever ideals may in the past have inspired conservation and conservationists, such as biological diversity protection and maintenance of landscape beauty, the consolidation and expansion of protected areas has become a key objective in the battle against global warming. Research across the globe indicates that "there is less deforestation within formally protected areas than in the areas surrounding them" (UN Environment Programme–World Conservation Monitoring Centre [UNEP-WCMC] 2008b, 3). Another independent survey of ninety-three strict-use areas in populated zones reached similar conclusions: "Tropical parks have been surprisingly effective at protecting the ecosystems and species within their borders in the context of under-funding and significant land-use pressure" (Bruner et al. 2001, 126). A study of Brazil's western state of Rondônia reached similar conclusions, showing that deforestation outside protected areas approached a level of 50 percent, compared with just 3 percent inside. The same survey found that the mere legal existence of such areas is known to deter illegal resource ex-

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percent of national territory. It embraces the "classic" Amazon rain forest (3.5 million square kilometers), as well as transitional areas of savanna or *cerrado*.

2. In Brazil, for example, the rate of Amazon forest loss increased by almost 4 percent in the twelve months to July 2008 from the previous year, to almost twelve thousand square kilometers. This prompted the minister of the environment to announce an ambitious plan to cut deforestation by 70 percent over ten years and to reinforce the existing "Plan for the Prevention and Control of Deforestation in Amazonia" (Gusmão 2009).

traction, even taking into account other variables such as distance from highways (Ferreira et al. 2002).

Though occupying 12 percent of the land, protected areas capture 15 percent of the world's carbon in their biomass and soil, or more than 312 gigatons of carbon (GtC). The impact of protected areas in this regard is especially pronounced in Latin America, where they retain almost 27 percent of the region's carbon stocks. Amazonia alone is estimated to capture 125 GtC, or 40 percent of the regional total, although scientists believe that the real figure could be significantly higher (UNEP-WCMC 2008a). It is expected that the Amazon Region Protected Areas forest conservation program (referred to subsequently) will eventually store 4.6 GtC, or one-tenth of the carbon remaining in the Brazilian Amazon. This could reduce annual carbon emissions by 1.1 GtC by 2050, equal to the total from all tropical deforestation and degradation in 2007 (WWF 2008).

THE RISE AND RISE OF CONSERVATION

Since the 1960s, and in particular from 1980 to 1995, protection has grown rapidly. Around 12 percent of the earth's surface (some 20 million square kilometers) comprises terrestrial protected areas, with more than 120,000 sites. Almost three-quarters of this area comes under various forms of strict nature conservation, in which no economic activities are permitted, with the remainder being managed for sustainable use, including to meet community needs (World Conservation Union–UN Environment Program [IUCN-UNEP] 2003; World Commission on Protected Areas [WCPA] 2008).[3] In Latin America, land under protection has more than tripled from 1.2 million square kilometers in 1992 to 4.3 million square kilometers today, accounting for about 22 percent of the total surface area (IUCN-UNEP 2003). A number of Latin American countries enjoy overall protection levels of 25–30 percent; these include Guatemala, Panama, Nicaragua, and Colombia, whereas Venezuela comes top of the list at more than 70 percent (WCPA 2008).[4] Brazil enjoys almost 30 percent protection in 1,444 designated units. Coverage of federally administered protected areas in Brazil has grown from 16 million hectares in 1985 to 70 million hectares in 2007, an increase of almost 340 percent (Mercadante 2007).

Levels of protection in the Amazon Basin specifically have also risen sharply in recent years; today more than 41 percent of its 7.8 million square kilometers falls

3. In 1994, the World Conservation Union (also known as the International Union for Conservation of Nature, or IUCN) defined protected areas as terrestrial or aquatic sites which are "dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources, managed through legal or other effective means" (UNEP-WCMC 2008b, 2). Under IUCN Protected Area Management Categories, protected areas are divided into seven classes: Ia, strict nature reserve; Ib, wilderness area; II, national park; III, natural monument; IV, habitat and/or species management area; V, protected landscape and/or seascape; and VI, managed-resource protected area. Human presence for the sustainable management of natural resources is permitted only in categories V and VI, which account for 29 percent of the total area protected globally (IUCN-UNEP 2003).

4. Venezuela enjoys 71 percent terrestrial protection in 231 designated units that cover 2.52 million square miles (WPDA 2008).

under some form of protection (Rede Amazonica de Informação Socioambiental Georreferenciada [RAISG] 2009). Brazil occupies two-thirds of the region, whereas Brazilian Amazonia itself covers 61 percent of national territory, an area larger than Western Europe. Here, more than one-fifth of the region's 5.2 million square kilometers are guarded in some three hundred officially decreed federal and state "conservation units."[5] However, if the 1.08 million square kilometers set aside as indigenous reserves (arguably among the most effective kinds of protected areas) are included in the count, this figure doubles to 44 percent of the Brazilian Amazon that enjoys some form of official protection (Veríssimo et al. 2011).

From January 2004 to December 2006 alone, some 23 million hectares of public forest reserves were set aside in Brazilian Amazonia (Nepstad et al. 2007). This process will accelerate as the Amazon Region Protected Areas (ARPA) project comes on stream, involving sixty-one protected areas and covering more than 310,000 square kilometers by 2013.[6] Other Amazon countries fare better still in terms of protecting their rain forest: Colombia at 56 percent and Venezuela 72 percent, with Ecuador and Peru trailing somewhat at 25 percent and 14 percent respectively (RAISG 2009; World Commission on Protected Areas [WCPA] 2008).

A strategy for enhancing the effectiveness of protected areas in providing ecosystem services is their linking through the formation of ecological corridors. These have in the past been justified principally in terms of biodiversity preservation in the face of growing anthropogenic pressures. Brazil is in the process of setting up a central Amazon corridor (Corredor Central da Amazonia [CCA]) and one for the Atlantic rain forest (Corredor Central da Mata Atlantica [CCMA]) originally under the auspices of the G7 Pilot Program.[7] Another major example is the Mesoamerican Biological Corridor (MBC), a transfrontier conservation area cluster embracing all protected zones within the eight countries of Central America, which is supported by the World Bank and other donors (Brockington, Duffy, and Igoe 2008).

Despite performing this crucial role, however, protected areas face growing anthropogenic pressures that threaten to undermine their effectiveness. An analysis of strictly protected areas in twenty-two tropical countries found that, although most were effective in guarding their borders against agricultural encroachment and were in much better condition than surrounding areas, they still came under great pressure from land clearing, hunting, illegal logging, fire, and grazing (Bruner et al. 2001). The situation in Brazilian Amazonia is illustrative. Two-thirds of the area under official protection (excluding indigenous reserves) is dedicated to sustainable use, whereas the remainder is fully protected (Instituto

5. Under the National System of Conservation Units.

6. Brazil's Ministry of the Environment coordinates ARPA, which a number of international donors also support, including the WWF, the Global Environmental Facility, the World Bank, and the German government.

7. The CCA covers more than 52 million hectares in the state of Amazonas. Seventy percent of that lies in protected areas, including sixty-five indigenous reserves and fifty-three conservation units. The CCMA brings together many small protected areas in a narrow coastal zone that is already 93 percent deforested. The zone covers 12 million hectares and is 95 percent superimposed on private properties (GOB 2007).

Socioambiental 2008).[8] A study of eighty-six strictly protected areas in Brazil published in the 1990s concluded that 55 percent were "less than minimally implemented" (Ferreira et al. 2002, 2). The situation has improved very little since then; more recent evaluations have documented poor effectiveness in management and rising deforestation in protected areas, with sustainable-use reserves faring particularly badly (Veríssimo et al. 2011; Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renovaveis [IBAMA] and WWF 2007). Logging, farming, and mining interests have pressured indigenous reserves, which are not included within the official system of protection.[9]

Against this backdrop, enforcement of conservation laws is notoriously problematic. Environmental agencies across the region are typically understaffed and poorly equipped, so that many conservation units remain "paper parks." Brazil's Ministry of the Environment (MMA) has admitted, for example, that more than half of the Amazon's three hundred officially protected areas have no inspectors, a quarter have no unit managers, and more than fifty do not even have a management plan as required by law (Radiobrás 2008). Another study of the country's state-sponsored protected areas found that only 18 percent had basic minimum support infrastructure and 80 percent had no resident officer.[10] In one case, a single person was in charge of Mapinguari National Park in Amazonas State, covering more than 1.6 million hectares of forest (Partlow 2009). According to the MMA, some two thousand staff are employed to run federal protected areas in Brazil but at least nine thousand are needed to do the job effectively (Mercadante 2007).

There has been a growing realization that the livelihood needs of communities must be reconciled with conservation goals through approaches such as the integrated conservation and development project (ICDP) and sustainable forest management. Rather than being automatically considered a threat to the environment, and without romanticizing this notion, local populations have increasingly become part of the solution for addressing resource degradation, whose skills and capacities may be harnessed for development and poverty reduction purposes (Brockington et al. 2008; Fisher et al. 2008; McShane and Wells 2004; Adams 2008; Wells and Brandon 1992). In this context, therefore, a major set of problems revolves around the challenge of providing the inhabitants of sustainable-use protected areas with the economic opportunities and incentives to undertake environmentally friendly activities that support local livelihoods while minimizing damage to the natural resource base, to avoid a tragedy-of-the-commons scenario (Hall 1997). This policy has been especially pronounced in Brazil, where appropriate legislation, vigorous civil society, and grassroots support have led to the

8. Fully protected conservation units (36 million hectares) include national parks, ecological stations, and biological reserves; indigenous reserves occupy an additional 108 million hectares. Sustainable use areas (47 million hectares) comprise national forests, extractive reserves, sustainable development reserves, and environmentally protected areas, among others (ISA 2008).

9. For example, of the forty-eight thousand applications for prospecting licenses made by mining companies in the Amazon region up to 2005, more than five thousand were on indigenous lands (Nóra-Sotomayor 2007).

10. Study by the Fundação Vitória Amazônica, quoted in "Parques de papel atrasam proteção na Amazônia," *O Estado de São Paulo,* August 26, 2007.

funding of many ICDPs since the Earth Summit of 1992 (Hall 1997, 2000, 2005; Hochstetler and Keck 2007).

Adapted forms of economic use such as extractivism, agroforestry, sustainable fishing, and ecotourism in theory offer such possibilities for generating complementary sources of income and livelihoods (Hall 1997; Fisher et al. 2008; Brockington et al. 2008). In practice, however, such options are not always viable, undermined by a series of often seemingly insurmountable problems, both local and contextual, which lead to high transaction costs that make production uncompetitive in national and international markets. In Brazil this combination of obstacles is popularly known as the Amazon factor. Local constraints include lack of technical capacity and training, poor management skills, insufficient access to credit, and inadequate production and transport infrastructure. Contextual impediments are no less serious, involving often huge distances from potential markets, low prices for forest products, and lack of policy support from government. All too often such projects become dependent on foreign aid with few national resources being applied, which raises doubts over national political commitment to this form of development and to its longer-term sustainability.

Such difficulties often induce local populations residing in sustainable-use reserves to resort to more conventional (i.e., destructive) forms of economic activity. For example, large sums have been invested in designing and executing a development plan for Brazil's Chico Mendes extractive reserve, which covers almost a million hectares in the state of Acre, to strengthen the livelihoods of its 1,700 families of rubber tappers.[11] However, this has shown only limited success, and reserves have experienced a number of management problems (Hall 1997, 2007). It has generally been concluded that poor planning and the inability to create alternative income-earning opportunities for rubber tappers is reflected in the growing conversion of extractive forests to raise cattle.[12] Yet although poor implementation capacity on the part of official and civil society institutions might be partly responsible, the root causes are undoubtedly deeper. Research has revealed the underlying complexity of livelihood strategies adopted by forest dwellers and the dangers inherent in assuming a uniformity of approach among extractivist populations that simply does not exist in reality. This issue is taken up in the final section of this article.

A particular bone of contention arising from the creation of strict protected areas is due to the consequent eviction of indigenous and other local populations. Latin America has remained relatively free of the conservation-induced population displacements associated with Africa and Asia (Brockington and Igoe 2006). However, environmental nongovernmental organizations (NGOs) and academic researchers have expressed concern that this could change if there is a big push to expand the number of protected areas. A study by the University of São Paulo, for

11. The reserve has been supported by a number of major NGO projects and the G7 Pilot Program to Conserve the Brazilian Rainforest.

12. On the Chico Mendes reserve in Acre, for example, forty-five thousand hectares of forest have been removed to raise ten thousand head of cattle (Machado 2008). Similar problems were reported on the Verde Para Sempre federal extractive reserve in the state of Pará, where forty thousand of its 1.2 million hectares have been deforested for logging and cattle ranching (Greenpeace 2009).

example, found that local populations resident in areas where twenty-two strictly protected units have been decreed are likely to be evicted (Barros 2007). This has resulted in local protests and moves to have the proposed units reclassified from fully protected to sustainable use, which would allow people to remain in their homes.

Related to this concern over potential evictions is the role of large international NGOs in setting the global conservation agenda. It has been argued that the quest for private funding coupled with increased competition among such organizations has led to the marketing of "branded" solutions and the imposition of a top-down blueprint model of conservation that often takes insufficient account of local conditions and fails to adequately involve local resource-user groups. In the words of one group of critics: "generalized global approaches fail for biodiversity conservation at local scales, because solutions must integrate extremely diverse natural, socioeconomic, and cultural systems and usually require a sense of community ownership" (Rodriguez et al. 2007, 755).

Conservation in Latin America has increasingly been supported through private land purchases by international conservationist NGOs and by individuals. The largest such NGOs raise hundreds of millions of dollars a year and, it is argued, form a powerful, self-serving conservationist lobby that could ride roughshod over community participation in the haste to consolidate its own vision of people-free protection (MacDonald 2008; Rodriguez et al. 2007). Such organizations, it is suggested, should invest more heavily in building local leadership and capacity, in particular through strengthening civil society organizations (Coad et al. 2008). This is especially critical when ICDPs are contemplated, which require a host of new management skills to be deployed by local stakeholders and for which complex issues of community identity and common pool resource management must be addressed (Ostrom 1990; Hall 1997; McShane and Newby 2004; Brockington et al. 2008).

Wealthy overseas industrialists and celebrities have also invested heavily in property with a view to promoting conservation, as in the case of Patagonia. For example, U.S. fashion magnate Douglas Tompkins purchased nine hundred thousand hectares in Patagonia to become the second-largest private landowner in Argentina, creating two park reserves in the process. Other large landowners in the region include Ted Turner, founder of CNN, and the Benetton family (Sánchez 2006). The wider public has also been targeted through Internet-based charities such as Cool Earth, which "sells" chunks of the Amazon rain forest to concerned citizens in the industrialized world. Headed by the businessman Johan Eliasch, Cool Earth purchased four hundred thousand hectares of Amazon rain forest for £8 million in 2006 with a view to resell segments. This provoked a strong reaction from the Brazilian government on the grounds that national sovereignty was being threatened, and Cool Earth's attention seems to have been diverted elsewhere (see Vidal 2007).[13]

Plans for national development and the regional integration of Latin America through infrastructure expansion may pose significant threats to the longer-

13. Cool Earth is currently offering half-acre plots in Peru (Ashaninka Reserve) and Ecuador (Awacachi Corridor) for between US$50 and $70 (see the Cool Earth Web site at http://www.coolearth.org).

term sustainability of protected areas. Perhaps the best-known national plan is Brazil's "Accelerated Development Programme," a multibillion-dollar enterprise that includes the construction of highways; the building of navigable river systems, ports, dams, and energy networks; and mining. Designed to facilitate the export of soybean, cattle, and minerals, heavy infrastructure investment has generated much opposition from environmental movements in view of potentially damaging environmental and social impacts (Lemos and Timmons Roberts 2008).

Brazil is now the world's largest exporter of soybean and beef cattle. One-third of Brazil's soya is produced in the Amazon region, especially in Mato Grosso, and had been spreading at an ever-increasing rate until the drop in commodity prices during 2008–2009. Agribusiness expansion has been spurred by the availability of cheap land, growing demand from China (in particular for livestock feed), and the development of soybean varieties adapted to Amazon soils and climate (WWF 2009). Although in the main only an indirect driver of deforestation, as it occupies degraded pastures vacated by cattle ranching, soya production serves to increase pressure on land and on protected areas by pushing forward the livestock front at the expense of native forests. However, there are signs that rain forest is also being directly cleared for soy cultivation.[14] More than a third of Brazil's cattle herd is reared in the Amazon. Agribusiness and logging together account for around 70 percent of Amazon deforestation (Fearnside 2005). More widely, the Initiative for the Integration of the Regional Infrastructure of South America (IIRSA) is designed to link the Pacific and Atlantic coasts via the highway network across the Andes through investments in transport, energy, and telecommunications to promote regional economic development. This is also predicted to have profound environmental and social impacts and to accelerate deforestation in the Amazon and Cerrado regions (Killeen 2007).

Yet conservation can be integrated into the planning of highway construction in an attempt to ameliorate the impact of road building as a major driver of deforestation.[15] This is the case with the pioneering "Sustainable Development Plan for the BR-163," the infamous soybean highway linking Cuiabá to Cargill's grain-export facilities in Santarém on the Amazon River. Protected areas, mainly indigenous reserves, constitute more than a quarter of the land within the almost 1-million-square-kilometer zone of influence of the road. As part of the plan to pave the highway, the "expansion and consolidation of a wide network of protected areas" is considered a top priority and a fundamental prerequisite for

14. Under Brazil's Forest Code (1965) private property owners in the Amazon have since 1996 been obliged to conserve 80 percent of their forest cover intact as "legal reserve" (increased from 50 percent). However, research in Santarém suggests that in some areas the supposedly protected areas of rain forest are being cleared for soya cultivation and that smallholders are being displaced into primary rain forest by commercial soybean producers (Steward 2007). A two-year moratorium was agreed to with many soy farmers supplying Cargill, based in Santarém, on the purchase of soybean cultivated on lands deforested after 2006, which expired in July 2009 (WWF 2009).

15. A study of deforestation trends from 1978 to 1994 in Brazilian Amazonia showed that most forest loss occurred within fifty kilometers of major highways (Nepstad et al. 1999).

effective governance of the highway corridor (Grupo de Trabalho Interministerial 2004, 23; Fearnside 2007).

A similar approach is being proposed for the reconstruction and paving of the BR-319 linking Porto Velho to Manaus, designed to facilitate the export of products from the Manaus Free Trade Zone to southern Brazil. Protected areas would be consolidated as a form of environmental bulletproofing to control the inevitable deforestation.[16] However, many questions have been raised over the effectiveness of such a conservation strategy in protecting the rain forest from rampant destruction once the region is opened up (Fearnside and Alencastro Graça 2006). Strategic environmental assessments in other parts of Latin America for transport and energy projects must grapple with similar risks and accommodate conservation policy to mitigate potentially adverse impacts.[17]

BRIDGING THE CONSERVATION FUNDING GAP

Studies have suggested that the costs of attacking climate change through reducing forest loss would be relatively modest. Stern (2007, 245) calculated that cutting deforestation in the eight countries responsible for 70 percent of land-use emissions "would be relatively cheap compared with other types of mitigation," requiring an annual expenditure of US$5–10 billion. Eliasch (2008) estimated that halving emissions from the forest sector by 2030 would cost between US$17 billion and US$33 billion. Yet other scientists have put the cost of achieving a 50 percent reduction in deforestation from 2005 to 2030 at up to US$28 billion a year (Kindermann et al. 2008). Such maximum estimates equate to between a quarter and one-third of the current total annual level of overseas aid.[18] In Brazil, for example, it has been estimated that an annual expenditure of €5.7 billion on preservation and wider development initiatives, the equivalent of 1 percent of GDP, would reduce GHG emissions by 70 percent (McKinsey and Company 2009).

Globally, these estimated costs are substantially higher than actual funding and investments in forest projects, which in 2004 amounted to just US$1.1 billion, with only a small proportion being spent on protected areas (Tomaselli 2006). Total global carbon markets in 2007 were worth US$64 billion, more than double that for the previous year (World Bank 2008), and up to US$118 million in 2008. However, little extra funding has been destined for the forest sector. Reforestation and afforestation projects have played an insignificant role in the Kyoto protocol (2008–2012). Additional finance for avoided deforestation has already been gen-

16. Along the BR-319, twenty protected areas covering over 11 million hectares are included in the plan (MMA 2008).

17. Infrastructure projects in the region include the following: Georgetown–Boa Vista Highway, Guyana; Pasto-Mocoa Amazon Highway, Colombia; Southern Interoceanic Highway, Peru; Northern Integration Corridor, Peru; Santa Cruz–Puerto Suárez Highway, Bolivia; Corridor Norte Highway, Bolivia; Pacific Highway, Nicaragua; Brazil-Bolivia gas pipeline; Madeira hydroelectric complex, Brazil-Bolivia; and the Camisea oil and gas project, Peru (McElhinny 2007).

18. Official development assistance stood at US$103 billion for 2007 (Development Assistance Committee, Development and Cooperation Directorate 2009).

erated through the voluntary carbon sector, which involves a small handful of conservation projects. Some voluntary initiatives actually preceded the UNFCCC by many years (Bayon, Hawn, and Hamilton 2007).[19] Yet the total voluntary carbon market is worth about US$400 million, only a small proportion of which is devoted to avoided deforestation projects (World Bank 2009). One recent example is the Iwokrama rain forest reserve in Guyana, whose future ecosystem services a private equity firm has purchased.[20]

Funding for forests could be substantially enhanced via compensation for the preservation of standing forest as part of carbon offset, cap-and-trade arrangements. This proposed mechanism has become known as Reduced Emissions from Deforestation and Forest Degradation (REDD), subsequently modified to REDD+, which includes enhancement of forest carbon stocks as well as avoided deforestation. Under the first commitment period (2008–2012) of the UNFCCC, only reforestation and afforestation projects are eligible for carbon offsets in official markets. However, in 2005 at the eleventh Conference of the Parties (COP11) to the UNFCCC held in Montreal, the Coalition for Rainforest Nations, which comprises more than forty countries, led by Papua New Guinea and Costa Rica, proposed including REDD to provide compensation for standing forest within official carbon trading after 2012.[21]

This proposal was formalized in 2007 at COP13 in the Bali Action Plan with an agreement that mitigation of climate change should include REDD incentives and initiatives. These could be designed on different scales: at the project, sector, or policy level. Since then, national governments and NGOs have submitted more than thirty proposals to the relevant technical UNFCCC body (Subsidiary Body for Scientific and Technical Advice) concerning what shape such an arrangement might take (Global Canopy Programme 2008). Most countries seem to favor market-based mechanisms ranging from the auctioning of carbon emissions permits in national cap-and-trade systems to the idea of rain forest bonds issued in private capital markets (Prince's Rainforest Project 2009). Yet others, notably Brazil, are more inclined toward international donor grants, as reflected in the country's new Amazon Fund (Government of Brazil [GOB] 2006).[22] It is likely that some combination of these two approaches will eventually be adopted (Viana 2009a).

In parallel with international negotiations over the shape of climate change policy after 2012, official aid organizations have been laying the groundwork by financing pilot REDD+type programs. Although still relatively few, they

19. The first carbon offset deal was brokered as far back as 1989 between AES, an American electricity company, and an agroforestry project in Guatemala (Bayon et al. 2007).

20. In March 2008, the U.K.-based private equity company Canopy Capital purchased the rights to future environmental services payments generated by the 371,000-hectare Iwokrama reserve. Canopy Capital would take a 16 percent share, with 80 percent going to local communities and 4 percent to the Global Canopy Programme, an alliance of twenty-nine scientific institutions in nineteen countries. Companies in Malaysia and Indonesia have struck similar deals (Butler 2009).

21. See the Web site of the Coalition for Rainforest Nations (http://www.rainforestcoalition.org/eng/).

22. Brazil's Fundo Amazônia has secured a US$110 million grant from Norway, disbursement commencing in 2010, with hopes to reach US$1 billion by 2015. Some of the funds will be used to strengthen protected areas.

nevertheless number in the hundreds and are highly important in terms of their experimental role in testing the viability of REDD procedures. For example, as a mark of its faith in REDD potential, the World Bank set up the Forest Carbon Partnership Facility to carry out project experiments and associated capacity building in some thirty-seven developing countries, including ten from Latin America (Forest Carbon Partnership Facility [FCPF] 2009).[23] In another initiative, the UN-REDD program, also launched in 2008, has approved US$55 million to support avoided deforestation projects in several Latin American countries, including Ecuador, Argentina, Panama, Paraguay, and Bolivia.[24]

It has been estimated that reducing deforestation rates by 10 percent could generate up to €9 billion or US$12 billion (Ebeling and Yasué 2008). A substantial portion of any extra funding could be used to fund avoided deforestation initiatives and to strengthen protected areas and the communities that live there (Coad et al. 2008). There are, of course, no guarantees that REDD+ funding mechanisms, whether donor or market based, would in practice have the capacity to raise such sums. Yet should such support materialize, it could help fill major conservation funding gaps. In Latin America, for example, barely 10 percent of protected area funding needs are met, and "long-term financing of protected areas is the most significant problem facing protected areas managers in the Andes-Amazon region, and the one on which the least progress has been made in recent years" (Hardner 2008, 2).[25] The annual cost of managing protected areas in the Amazon Basin has been estimated at US$200 million, much greater than levels of funding earmarked for this purpose (McElhinny 2007).

Given its dual role in simultaneously providing key environmental services and being the world's major source of tropical deforestation, Amazonia occupies a key position in this debate. Nepstad and colleagues (2007, 7) confirm that Brazil is "superbly positioned to benefit from a REDD program," as three-quarters of its carbon emissions come from Amazon deforestation. They estimate that reducing deforestation from its historic level of around twenty thousand square kilometers annually to zero would cost US$72 million in the first year to US$530 million in the tenth year of a REDD program. About half of the payments would support the livelihoods of two hundred thousand people in public forests, and around 15 percent would be used to compensate forest reserves in private ownership. Significantly, about one-third of this total (US$188 million in the tenth year) would be employed to support the establishment of new protected areas and to strengthen reserve management, as well as to provide technical and social services for local populations. According to these calculations, over a thirty-year period, total REDD payments of some US$8 billion could reduce carbon emissions by 6 billion

23. Launched in 2008 and involving thirty-seven countries, the FCPF raised US$100 million in its first year, and this figure will soon double (FCPF 2009). It includes the following Latin American countries: Argentina, Bolivia, Colombia, Costa Rica, Guyana, Mexico, Nicaragua, Panama, Paraguay, and Peru.

24. UN-REDD Programme, "About the UN-REDD Programme," http://www.un-redd.org/AboutUNREDDProgramme/tabid/583/language/en-US/Default.aspx.

25. A study of several protected areas in Peru revealed, for example, that they could at most cover only 15 percent of their running costs, whereas the well-known Pacaya Samiria National Reserve had a shortfall of between 60 percent and 80 percent (Hardner 2008).

tons, thus generating considerable ecosystem and social benefits within Amazonia and well beyond.

By virtue of its sheer geographical domination of Latin America, covering almost two-thirds of the Amazon Basin, for example, Brazil is leading the way in developing payments for ecosystem services (PES) initiatives in anticipation of a post-Kyoto REDD policy framework. Harnessing PES to promote sustainable Amazonian development was first suggested in the 1990s (Fearnside 1997). Early carbon sequestration projects in Brazil include the Nova Gerar landfill scheme located in the industrial region of Nova Iguaçu in Rio de Janeiro, the Plantar project in Minas Gerais, the Peugeot reforestation scheme in Mato Grosso, and the Bananal Island conservation area in the state of Tocantins (Hall 2008c). The ecological value-added tax (ICMS Ecológico) is a state government initiative that allocates 2.5 percent of value-added-tax revenues to compensate municipalities for tax income lost through the designation of standing forests as protected areas. Originally developed in the southern states of Paraná and São Paulo, this measure has been adopted more widely, and in the Amazon region it benefits Rondônia, Mato Grosso, and Tocantins. Other PES initiatives in Brazil include compensatory payments to offset the environmental impact of new projects, such as the Atlantic Forest Fund in Rio de Janeiro, which supports strict-use protected areas in the state.[26] In addition, there are payments for watershed services, gas and oil royalty payments, tax exemptions to landowners who set up private nature reserves, revenue from forest concessions, commercial forestry certificates, and (proposed) green income-tax deductions (for further information, see Lerda and Zwick 2009).

The federal government's Proambiente program for supporting small farmers was launched in 2000 by a civil society coalition of NGOs and rural trade unions in Amazonia. Originally involving some four thousand families in ten "development poles" scattered throughout the region, limited payments have been made to small farmers to compensate them for sustainable farming practices such as agroforestry and extractivism. Implemented by the Ministry of the Environment in 2004, the program had its problems and was closed six years later. Proambiente has nevertheless provided useful lessons that will help guide future projects of this kind (Hall 2008a, 2008c; Wunder 2008). In addition to the ecological VAT already mentioned, the economic viability of extractive reserves in the Amazon has been strengthened though the payment of subsidies on the price of latex to rubber tappers under the 1999 Chico Mendes Law (Hall 2008b).

The best-known avoided deforestation project in Brazil aimed specifically at protected areas is Bolsa Floresta, or "Forest Stipend" (Hall 2008a; Viana 2009b). Initiated in 2007 by the Amazonas state government, the scheme is underpinned by a new state law promoting sustainable development and payments for environmental services, and it is administered through the Sustainable Amazonas Foundation (Fundação Amazonas Sustentavel). It is intended to support a total of

26. The experimental fund, administered by the Brazilian Biodiversity Fund, was set up under Brazil's Environmental Compensation Law (2000), which imposes a fixed fee of 1.1 percent of development costs on projects to be channeled into creating and supporting heavily protected areas (Zwick 2009b).

six thousand families on five forest reserves, involving a total annual investment of more than US$8 million. A US$40 million trust fund is being set up with support from the state government, the Bradesco Bank, and other private contributors such as the Marriot hotel chain and Coca-Cola.[27] Commencing on the Juma Sustainable Development Reserve, monthly grants of R$50 (US$23) in subsistence support are paid to families "committed to zero deforestation" through extractivism, agroforestry, and tree-fruit cultivation (Viana 2009b, 2). Funding is also provided for income-generating projects and community infrastructure.

Other Amazon states in Brazil are in the process of introducing REDD+ schemes for small farmers, thus stealing a march on the federal government, which has been slow to consolidate and expand national plans such as Proambiente. Pará is planning its Campo Cidadão program for 120,000 small producers, which includes a PES component to help recover degraded areas of obligatory legal reserve (Pará 2008). In the same state along the Transamazon Highway, the REDD for Amazon Smallholders (RAS) program will compensate producers for the opportunity costs of practicing avoided deforestation and moving toward more sustainable land management models (Instituto de Pesquisas Ambientais da Amazonia [IPAM] 2009). The state of Acre has announced the most recent REDD+ scheme to support small farmers and extractivists in recuperating degraded areas and introducing more sustainable agrarian systems (Acre 2009).

Because larger farmers are the main drivers of deforestation in the Amazon, two Brazilian schemes will target cattle ranchers in Pará and Mato Grosso in an attempt to modify and reward conservation and positive land management practices, reducing deforestation rates and carbon emissions. In São Félix do Xingú, southern Pará, which has the country's second highest rate of forest loss, a pilot project will target some fifty landowners with appropriate technical support and financial incentives to facilitate a transition to more environmentally friendly practices (IPAM 2009). A similar scheme is being designed for Mato Grosso involving both small farmers and larger commercial producers (Mato Grosso 2009).

Although Brazil is presently at the forefront in developing local REDD+ programs, Costa Rica set up the world's first, and so far only, national PES program in 1996. This rewards landowners for conserving forests through reforestation and maintenance of existing trees. Industries compensate their carbon emissions through a tax on fossil fuels and the purchase of carbon offset certificates. The scheme covers some 5.5 percent of the country and benefits more than 4,400 landowners (Zbinden and Lee 2004; Pagiola 2008). Another well-known early initiative is the Noel Kempff Mercado Climate Action Project (NK-CAP) for the preservation of more than 830,000 hectares of national park tropical forest in northeast Bolivia, one of the earliest REDD schemes on the continent (Nature Conservancy 2009). In the Cauca Valley, Colombia, downstream sugarcane growers affected by flooding pay poor upland farmers to protect the watershed, thus reducing damage and bringing development benefits to the communities. From 1995 to 2000, some US$1.5 million was generated for investments in the uplands. In Chiapas, Mexico, a pioneering attempt is under way to set up an international market for

27. Marriot places a US$1 dollar voluntary levy on its guests for this purpose.

carbon storage to benefit poor communities. Companies wishing to offset their emissions can buy carbon credits from a local NGO, with two-thirds of the revenue going to local farmers (World Resources Institute 2005). Other examples of PES projects from Bolivia, Peru, Colombia, Mexico, and Ecuador could also be cited (for further details, see Grieg-Gran, Porras, and Wunder 2005; Poats 2007; Cenamo et al. 2009).

CONSERVATION AND REDD: BLESSING OR CURSE?

Until recently, conservation in Latin America lacked a wider basis of political support, rendering it impermanent and unpredictable. In his seminal work on Amazonia, for example, commenting on the development of conservation policy until the late 1980s, Foresta (1991, 255) lamented "conservation's lack of a political constituency, which was because none of the powerful players in the Amazon political arena had more than an abstract interest in what conservation promised." Since the 1990s, however, the challenge of tackling climate change through minimizing deforestation has brought a new immediacy to conservation. Its strategic importance is underpinned by science; by various stakeholder groups, including an active NGO sector; and by the broader public (Hochstetler and Keck 2007).[28] Furthermore, the possibility of harnessing new and substantial funding sources from REDD could provide a much-needed economic boost for promoting conservation and sustainable land use. However, acquiring increased financial support is merely the first step in a long and tortuous road toward making avoided deforestation effective as a conservation tool.

An overarching challenge that needs to be addressed at the outset is to recognize and reconcile the meeting of strict economic objectives within the prevailing neoliberal, profit-based model of conservation with the adaptation of policy solutions to deal with the complex economic and social needs of forest communities within a broader, "rights-based" perspective. Conservation policy is increasingly dominated by a market-oriented approach and the commodification of natural resources. As noted by Brockington and colleagues (2008, 175, 197), "conservation and capitalism are intertwining in the spread of some protected areas and rise of conservation NGOs . . . as a driver for sustainability." This could lead to "a world view in which conservation and consumption are not only seen as compatible but mutually dependent on one another."

Clearly, economic viability is critical for the longer-term sustainability of reserves. However, there are inherent dangers in placing undue emphasis on financial returns within a one-size-fits-all blueprint approach. First, the microeconomics of household and community livelihoods is far more complex than many policy makers acknowledge, thus requiring a targeted, location-specific approach rather than general solutions. Second, there is a danger that focusing overwhelmingly on financial profit as a motivation for conservation will obscure other social drivers such as risk avoidance or the pursuit of new opportunities through the

28. An opinion poll in Brazil by Datafolha (2009), for example, showed an unprecedented 94 percent level of public support for halting deforestation and environmental destruction.

accumulation of nonmonetary capital assets. Third, within a purely economic framework, questions of human rights and the environmental entitlements of key forest dwellers such as indigenous populations may receive rather less emphasis than would be desirable, unless the groups in question are well organized politically to contest neoliberal perspectives.

Research has thrown new light on the evolving nature of livelihood strategies among forest populations, which suggests that outside perceptions are often simplistic and lead to inappropriate policy solutions; for example, the development of uniform reserve management plans for what are in practice communities characterized by varied and changing patterns of resource use. In the case of Brazil's extractive reserves, for example, the decline of the rubber economy and the withdrawal of state subsidies in the 1990s has resulted in a gradual increase in farming and small-scale cattle ranching on reserves as former tappers have adapted their livelihood strategies to changing circumstances, thus providing security and reducing risk for their households. At the same time, however, conservationists consider the presence of cattle in large numbers largely incompatible with protected area management. Thus, despite the sometimes wishful thinking of outsiders in holding up this forest-based model as a conservation ideal, "residents may not be practicing the same livelihoods envisioned by reserve proponents" (Salisbury and Schmink 2007, 1237). Of course, such apparent contradictions are not confined to Brazil. Research on the Pacaya-Samiria reserve in Peru has also confirmed the variety and complexity of resource-use patterns even within relatively small geographical areas, conditioned by differential household assets, access to markets, and other variables (Coomes, Barham, and Takasaki 2004).

Incorporating potential REDD income flows to support conservation policy raises a number of issues that must be considered in both their economic and their sociopolitical dimensions. A basic prerequisite to facilitate the introduction of REDD policies is still elusive in most countries; namely, a legal framework to recognize and regulate systems of payments for environmental services, such as that presently being considered by Brazil's Congress (Hall 2008a).[29] Once in place, however, a number of major implementation and governance challenges need to be addressed (Peskett et al. 2008; Myers 2008).

First, the question of efficiency versus equity in the competition over REDD funding will become central. That is, whether funds should be targeted principally at the major drivers of deforestation such as loggers, cattle ranchers, and soya producers, or whether they should be more equitably shared with traditional and smallholder groups with a view to promoting conservation alongside poverty alleviation and social justice (Wunder 2006b; Hall 2008c). The probably high transaction costs of implementing REDD will favor large landowners and could lead to the capture of benefits by wealthier groups, as has tended to happen with forestry projects within existing carbon markets (Coad et al. 2008). There are, therefore, important implications for supporting poorer resource users on sustainable development reserves. For example, the full inclusion of indigenous

29. As of 2010, six bills were going through Congress, with a view to approving the National Program of Payments for Environmental Services.

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groups in REDD+ negotiations is essential, bearing in mind both their rights and their potential contributions to climate change solutions and the management of protected areas (Griffiths 2007; Davis 2008; International Work Group for Indigenous Affairs 2008).

Second is the general problem of leakage, in which illegal activities are simply displaced from protected to unprotected areas, thus undermining the whole process and possibly neutralizing any net gains from conservation. Leakage can also be indirect if REDD forces up the price of timber, livestock, and food crops, thereby encouraging deforestation elsewhere. Leakage may occur at national or international levels and is, almost by definition, extremely difficult to control or to measure. In the Amazon, for example, limiting the effects of leakage on overall deforestation and degradation will depend on how well governments at state and federal levels manage to enforce environmental laws, on one hand, and, on the other hand, promote nondestructive patterns of resource use and development in tandem with conservation policies. Well-designed, community-based conservation initiatives are, arguably, likely to be more effective in avoiding leakage than are larger private landowners. The latter could more easily displace predatory activities to other holdings while capturing financial benefits, whereas local community groups would be far more dependent on their immediate joint endeavors.

Third, funding for protected areas through REDD+ raises the issue of additionality, that is, reduced deforestation as measured against a baseline. In situations where the risk of deforestation is already low, as on strict-use and isolated reserves (rather than on those where economic activities are permitted and/or located close to the agricultural frontier), the question arises of how eligibility for REDD+ funding can be established. Because REDD+ rewards additional reductions in emissions, special policies would have to be devised to support those authorities, whether at the local or national level, which have historically been successful (either by accident or by design) in protecting their forests. Those that cannot necessarily demonstrate reduced deforestation over time would have to be rewarded through some other mechanism. In this context, REDD+ payments could, despite the problem of determining additionality, have a preventive function in guarding against potential destruction as the frontier advances.

Yet it could be argued that, in the absence of effective evaluation to assess their impact, such conservation projects could be getting money for nothing on the basis of no real evidence of positive impact (Ferraro and Pattanayak 2006). In a worst-case scenario, opportunists driven by perverse incentives could provoke deforestation in the hope of claiming financial compensation or even threaten to allow forest destruction for "development" purposes unless recompense is granted. In such cases, the dividing line between securing environmental rights, on the one hand, and, on the other hand, practicing a form of environmental blackmail—"greenmail" in this case—could become rather blurred. Such ambiguity is, arguably, evident in the case of Ecuador's offer to forgo oil exploration in its 2.5-million-hectare Yasuni National Park in the Amazon, in exchange for US$3.5 billion compensation from the international community (see, e.g., the Amazon Watch Web site, at http://amazonwatch.org/work/yasuni).

Fourth, the permanence of any emissions reductions on individual reserves might be threatened by subsequent human or natural disasters such as fires and occupations, as well as by interruptions in financial compensation, as there are no guarantees that funding will be continuous or limitless. As with the leakage issue, this might call for a national, regional, or policy-based approach that would consider aggregate variations in deforestation rates within a given political jurisdiction. Yet although this may allow for greater flexibility in deciding how protected areas should be managed, a tragedy-of-the-commons scenario could emerge in which reserve administrations eschew responsibility for their individual contributions to collective emissions but still expect to receive financial rewards.

However, it would be a mistake to assume that the adoption of sustainable practices or the permanence of emissions reductions need necessarily be contingent on an uninterrupted income flow, either through carbon trading or a central fund of some description. The literature on environmental service payments has tended to concentrate on monetary incentives as the major driver of decision making by resource users, yet this is only part of the picture. Although economic factors are an important and critical element in determining conservation choices, they are by no means the only consideration, especially in the case of forest users at the community level. Larger commercial producers will undoubtedly be motivated primarily by the offer of immediate economic compensation for the opportunity costs incurred in switching from market-based activities such as logging or ranching to forest conservation. Even for poorer farmers and extractivists, it would be naive in the extreme to believe that economic calculations play little or no role in their decisions and that there is some inherent or automatic conservation ethos among forest peoples regardless of their material situation. There can be no doubt that cash payments are a valuable complement to household income and livelihoods, alleviating monetary poverty and facilitating the purchase of conservation-related goods and services such as seeds, implements, and equipment.

However, research suggests that a broader range of needs and interests beyond immediate economic returns drives conservation behavior. Within Brazil's Proambiente PES program, for example, payments to small farmers were far fewer and more sporadic than promised. Yet most producers continued to practice extractivism and agroforestry, introducing new practices such as minimizing the use of burning, reforesting river banks to regenerate water supplies, and diversifying production—especially in forest-friendly products—to increase income and spread risk. Against all the odds in many cases, farmers maintained their commitment to the conservationist philosophy of the program (Hall 2008a; Bartels 2009). A little extra cash from the government has been highly welcome, but this is not what kept them going. They realized that their very livelihoods and futures depended on maintaining the forest ecosystem relatively intact, with or without cash payments. The need to take due account of nonmonetary factors as motivating forces behind conservation activities has been demonstrated more broadly (Muradian et al. 2010). Thus, incentive structures within systems of PES in support of protected areas would have to be adapted to suit the interests and needs, both cash based and otherwise, of particular groups operating in the system.

A fifth challenge is related to the price of carbon. Because REDD-certified emissions reductions (CER) credits are expected to be relatively inexpensive, fears have been expressed that they could flood and destabilize the market, drive down the price of carbon, and discourage investment in clean technologies (Livengood and Dixon 2009; Stern 2007). Nepstad and colleagues (2007), for example, based their calculations for REDD in the Amazon on a price of US$3 per ton of carbon, compared with an average level of $25 per ton traded in 2008. A low carbon price has been one of the reasons Brazilian officials have customarily given to justify their opposition to market-based REDD mechanisms and in favor of government funding. However, fears on the part of the foreign ministry (Itamaraty) of "internationalization" of the Amazon and loss of national sovereignty have also been suggested as consequences of carbon trading, alongside the view that industrialized countries would be let off the hook by being allowed to offset their emissions in this way (Fearnside 2001; Becker 2004).

Finally, there are issues around the scale and quality of technical expertise necessary to design locale-specific projects adapted to the particular environments. The need to recognize the diversity and dynamics of changing resource-user livelihood strategies of those inhabiting protected areas has been discussed already. This will necessitate greater investment in time and resources to assess local needs and target them more effectively (Coomes et al. 2004). Other technical issues include such questions as the definition of environmental services to be compensated, mechanisms for the enforcement of conditionalities, measurement and verification of emissions reductions, and the certification of achievements to qualify for payments, all of which may lead to higher than anticipated transaction costs (Wunder 2006b; Wunder 2008).

Latin America has seen three decades of funding for community-based conservation and development schemes, grouped under the umbrella term *integrated conservation and development* (ICDP), which incorporates many of the design features that will form the basis of proposed REDD+ projects. Yet some observers have been dismayed by the apparent lack of clear progress toward the generation of sustainable benefits either for the environment or for local populations (Naughton-Treves, Buck Holland, and Brandon 2010). It is therefore imperative that REDD+ policy bite the bullet, so to speak, and incorporate the harsh lessons generated by years of previous experience to avoid the serious pitfalls of the past (Campbell et al. 2010).

For example, there has to be a move from fixed to more flexible models of resource conservation. As noted by Salisbury and Schmink (2007, 1237), "substantive shifts in livelihood strategies underscore the need for policies to account for the dynamism of Amazonian livelihoods rather than trust in static organizational units." Although this will undoubtedly increase the transaction costs of supporting protected areas, they are justified by the invaluable role that communities play in the conservation process. These provisions must be built into the management of forest reserves, whether strict use or sustainable development. In the case of the latter, the challenge is to boost community incomes from environmentally friendly activities through ICDPs and sustainable forest management. The strict

conservation agenda should not be allowed to "deprive communities of their legitimate land-development aspirations" (Wunder 2006a, 23).

Yet these issues are symptomatic of the much wider problem of poor implementation capacity. There is a major risk that REDD funds could remain unspent or be inappropriately applied as a result of a lack of administrative and technical capacity on the ground, as has been demonstrated with other environmentally inspired programs funded by external sources.[30] As suggested earlier, protected area management and incorporation of REDD payments will have to take into account both economic and noneconomic factors that influence resource-user decision making to maximize conservation potential.

Another wider potential limitation is whether donors will actually be prepared to contribute on a substantial scale to international funds for REDD+ programs that cannot be effectively implemented, especially if the government bureaucracies on which they rely are subjected to public spending cutbacks. Given the fungibility of aid money, donor support for REDD+ could result in reduced levels of government spending for environment ministries. Added to this problem are political tensions between central and local administrations, as in Brazil, for example, on the most appropriate financial mechanisms to be harnessed to support REDD+ initiatives.[31] Amazon governors have openly declared their faith in a combination of donor funding and carbon trading and have petitioned the central government to broaden its approach.[32] The federal government is strongly in favor of international donor funds such as the new Fundo Amazônia, although it has now come to accept the principle of complementary, limited carbon trading to generate REDD funding.

In conclusion, there is little doubt that REDD+ policies offer the potential for mobilizing substantial new funding to support conservation, to fight climate change, and to enhance the livelihoods of forest-dependent populations in Latin America. From grassroots organizations to the agribusiness lobby, NGOs, and government environmental agencies in charge of protected areas, expectations have been raised to new heights as negotiations for a post-2012 climate change agreement evolve. Indeed, there has been some cause for optimism on REDD policy, with funding being promised at the otherwise disappointing COP15 meeting

30. A case in point is the US$400 million G7 Pilot Program to Conserve the Brazilian Rainforest, which was significantly underspent at the end of its first phase (Rueda et al. 2006).

31. These differences between state and federal officials were evident at the fourteenth Katoomba Meeting, held in Cuiabá, Brazil, in April 2009 to discuss ecosystem payments (Zwick 2009a). On June 26, 2009, Brazil's nine Amazon state governors signed a letter to President Lula urging him to support the inclusion of avoided deforestation within carbon markets after 2012 when the current Kyoto protocol expires (Friends of the Earth 2009).

32. In November 2008, Brazil's Amazon governors signed the "Manaus Letter," declaring their intention to establish GHG reduction and PES policies and calling for a fair distribution of funds from the federal government's Fundo Amazônia (Friends of the Earth 2008). Governors Antônio Góes da Silva (Amapá), Eduardo Braga (Amazonas), Blairo Maggi (Mato Grosso), and Ana Júlia Carepa (Pará) also signed a memorandum of understanding with U.S. governors Arnold Schwarzenegger (California), Rod Blagojevich (Illinois), and Jim Doyle (Wisconsin) to collaborate on carbon offsetting under REDD after 2012. Representatives from Indonesia and Papua New Guinea were also present.

held in Copenhagen in December 2009 and reaffirmed a year later in Cancun. Initial donor funds have been pledged, and an international voluntary REDD+ Partnership has emerged.[33] Yet despite laudable commitments from bilateral and multilateral donors, there is a strong risk that, in the rush to climb onboard the REDD bandwagon, mounting demands from an array of stakeholders will vastly outstrip the supply of both funds and execution capacity. Under these circumstances, a measured and experimental approach is required to avoid an eco–gold rush, which could spell further disaster for the environment.

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