Reducing Emissions from Deforestation and Forest Degradation

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Abstract

Reducing emissions from deforestation and forest degradation (REDD+) policies, projects, and interventions are among the most prominent of recent attempts to mitigate climate change. Because REDD+ projects focus on forests, they simultaneously affect socioeconomic and ecological outcomes at local, subnational, national, regional, and global levels. This review assesses the promise of REDD+ for the continued ability of forests to provide multiple benefits to human societies at multiple scales. We survey REDD+ efforts at different levels, examining them through an actor-oriented approach. The article highlights the criticality of collaborative action to enhance desired outcomes of REDD+ efforts. In summarizing major REDD+ future trends, the paper emphasizes the need to learn from past forestry, agricultural, biodiversity, and development policies, and for adaptive policy making.

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INTRODUCTION

An effective mechanism for reducing emissions from deforestation and forest degradation (REDD+), a key goal of current climate negotiations, will require unprecedented flows of funds to rural areas and forestry stakeholders, transformation of current forest governance arrangements, and ambitious innovations in monitoring and verification technologies so that reductions in terrestrial emissions can be compensated through market-based mechanisms and/or intergovernmental transfers of funds. Nonetheless, early signs of social and ecological disruptions associated with climate change and larger looming catastrophes have brought terrestrial emissions and their role in mitigation into sharp focus for researchers, activists, and decision makers alike. Reductions in terrestrial emissions are believed to be more cost-effective than those in other sectors (1–3), despite concerns on the part of some that existing projections understate many costs associated with reducing deforestation and enhancing forest growth and carbon sequestration (4, 5). The presumed low costs through which terrestrial emissions reductions can be achieved have led many scholars and decision makers to view and portray REDD+ initiatives as an attractive PES (payments for environmental services) strategy on a grand scale (6).

With 12% to 17%, and perhaps more of total annual greenhouse gas (GHG) emissions at stake (7, 8), progress under a REDD+ mechanism remains critical to hopes of limiting future climate change. Indeed, over the past few years, REDD+ has come to symbolize an area of optimism in relation to climate change mitigation even as movement in many other areas, such as technology transfer, requisite adaptation finance, and concrete emissions reductions targets, remains stalled. The failure of international negotiations to finalize a new climate treaty in Copenhagen in 2009, combined with blocked legislative processes in the United States, Canada, and Australia that would have created a large demand for REDD+ offsets, greatly diminished the prospects of a near-term, unified global mechanism for REDD+ financing. In spite of positive developments at the sixteenth Conference of Parties (COP) in December 2010 in Cancun, progress on REDD+ is likely to occur through complex, fragmented pathways of international assistance, bilateral and multilateral agreements, and civil society and market-based processes. The only near-term regulatory framework for REDD+ financing is the one under development between tropical states and provinces and the government of California.

At its core, REDD+ is a financial incentives-based strategy to compensate national governments and subnational actors in return for demonstrable reductions in carbon emissions from deforestation and forest degradation and enhancements of terrestrial carbon stocks (9). It was formulated in the aftermath of negotiations of the Kyoto Protocol that excluded "avoided deforestation" and limited the role of forest carbon to sequestration within Clean

Development Mechanism projects (10). The emphasis on compensation of nationwide reductions in emissions from deforestation, initially called "compensated reduction" (11), was an important innovation that addressed the issue of displacement of deforestation within national jurisdictions.

A better understanding of the dynamics of land-use and land-cover change in the 1990s and the early years of this millennium (12) led to the identification of perverse local incentives, national policies, and global market demands as leading drivers of tropical deforestation. PES projects were designed at least partly in response to the realization that landowners could be persuaded through cash payments not to deforest. As the popularity of PES increased, the idea of a unified market mechanism to reward carbon storage and sequestration also took hold in international debates throughout the first decade of the twenty-first century. REDD+, as it stands at present, is the culmination of a long process of efforts to curtail tropical deforestation.

The current process of incorporating deforestation into global climate negotiations was set in motion during the eleventh COP in 2005 in Montreal. In Montreal, on behalf of the Coalition of Rainforest Nations, Papua New Guinea and Costa Rica proposed the establishment of a mechanism called Reducing Emission from Deforestation in Developing Countries, or RED, through economic and financial incentives. The proposal built from existing conversations around the idea of avoided deforestation (11) and was quickly expanded to include forest degradation. REDD was formally accepted in principle at COP 13 in 2007, and the Bali Action Plan explicitly recognized its role as one of the building blocks of a new climate agreement (13). By 2008, during the fourteenth COP in Poznan, its scope had further expanded to include other options and was designated as REDD+. Since Poznan, REDD+ has been officially defined as follows: "Reducing emissions from deforestation and forest degradation in developing countries (REDD); . . . and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries" (14, p. 2).

In spite of this limited official definition, the plus sign after REDD was widely believed to include what are known as safeguards, such as protection against human rights violations and adverse effects on local forest-dependent communities and indigenous peoples. These safeguards were only formally included in the concluding text at the COP 16 in Cancun in December 2010, or what is called the Cancun Agreements (15). More recently, scholars have pointed to the need to examine emissions from all land-use activities in efforts to reduce terrestrial emissions. Moving beyond forests to encompass the entire landscape, the approach has been characterized as REDD++, although it has not had much traction within climate treaty negotiations so far.

Agreement to move forward with REDD+ was one of the few points of consensus to emerge from the failed negotiations at COP 15 in Copenhagen in 2009. This progress continued at COP 16 in Cancun in 2010, with an international agreement on the broad contours of REDD+, including a clear reference to the need to address drivers of deforestation and forest degradation and specific language regarding safeguards (16). Two elements of the outcome at Cancun are important for the future of REDD+. First, the Cancun agreement legitimized the bilateral and multilateral processes already unfolding around REDD+, but outside the United Nations Framework Convention on Climate Change (UNFCCC), and therefore moved further away from the initial idea of a unified global mechanism under an international treaty. The Cancun agreement divided the implementation of REDD+ activities into three phases and invited developed countries to support developing countries during the first and second phases through bilateral and multilateral channels outside the UNFCCC.

Second, crucially important issues were postponed to the future. These include the possibility of a unified financing mechanism for REDD+ under an international treaty and determination of reference levels of carbon

emissions at the national level. The lack of agreement on a funding mechanism means that all finance options are open, casting further doubt on the emergence and consolidation of a global carbon market. Of equal importance is the equivocation on the calculation of reference levels from which emissions reductions will be calculated. This thorny political question was delegated to the Subsidiary Body for Scientific and Technological Advice, and debate was postponed by one year (17). In the absence of any funding, clear financing mechanism, and lack of consensus on reference levels, the Cancun agreement has effectively ceded leadership on REDD+ to bilateral and multilateral processes outside the UNFCCC. The failure to finalize negotiations on the specifics of a treaty may be a symptom of the inherent plurality and fragmentation of national legal frameworks, policies, cultures, and traditions that determine the way forest resources are governed (18).

Currently, payments for reduced terrestrial emissions and for creating the institutional conditions for improving future carbon sequestration are occurring primarily through intergovernmental resource transfers. But a more effective REDD+ is likely to depend on the success of ongoing experiments with hybrid governance structures, combining inputs from public, civic, and market institutions, as well as the development of a bigger, more efficient carbon market in which emissions reductions through REDD+ can be traded. In addition to concerns about financing and reference levels, the long-term success of REDD+ in facilitating the exchange of carbon for money likely depends crucially on at least three additional factors: technological innovations in remote sensing and monitoring to assure buyers that they are paying for real carbon sequestration, forest governance reforms in implementing countries to align institutional arrangements with REDD+ objectives, and social and political changes at multiple scales that permit broader participation in forest protection and carbon sequestration. Many of these additional factors are now beginning to be emphasized and recognized as critical to the success of REDD+ efforts (19).

This article provides a synopsis of available knowledge about REDD+ interventions and reviews how REDD+ efforts can be made more effective, efficient, and equitable. The first part of the paper reviews analyses that point to likely impacts of REDD+ in three key domains: carbon sequestration, biodiversity conservation and ecosystem services, and rural livelihoods and participatory resource governance. The next section assesses REDD+ initiatives using an actor-oriented approach, focusing, in particular, on government, market, and civil society actors, and includes initiatives in which actors from more than one domain may be involved. This discussion prepares the ground to examine how the strengths and capacities of these different sets of decision makers can be brought together for a more effective REDD+ design and for implementation. The concluding section flags the basic lessons and relevant emerging issues.

CARBON, BIODIVERSITY, LIVELIHOODS, AND REDD+

Current studies and analyses of REDD are typically motivated by concerns about the effectiveness of REDD+ policies and projects in three key dimensions. The first is whether REDD+ will lead to successful reduction of emissions from deforestation and forest degradation or via enhancement of forest carbon stocks. This literature highlights potential threats to enhanced carbon storage owing to faulty design or implementation of REDD+ projects and policies, limited availability of funds, lack of governmental capacity at various levels, corruption, leakage, impermanence of storage over time, information gaps, and failures to match compensation to performance (20).

A second major area in which existing scholarship examines the potential impacts of REDD+ is biodiversity and ecosystem services (21). Studies point to the substantial international funding flows REDD+ is already generating, and the extent to which such flows can be harnessed to support biodiversity conservation and the protection of watershed functions (9).

But existing research also recognizes the possibility that certain types of REDD+ projects, e.g., tree plantations, may negatively influence biodiversity and conservation, and that REDD+ projects may threaten biodiversity in low-carbon density ecosystems (22).

In addition, a large number of studies have expressed important concerns about the potential negative impacts of REDD+ on local livelihoods, equity, poverty, and participatory resource governance as a result of inattention to design and implementation of REDD+ projects or exclusive attention to carbon sequestration (23, 24). A focus on carbon, these studies suggest, can lead to forest governance strategies that would roll back the limited gains poor communities have made since the 1980s in accessing greater benefits from forests.

These three dimensions of writings on REDD+ correspond closely with the three most prominent benefits forests present to humans—carbon storage, which has gained prominence recently because of threats posed by climate change; biodiversity and related ecosystem services, a primary concern of conservationists and ecologists; and livelihoods and revenues because more than a billion people depend on forests for survival (25).

REDD+ and Carbon

Some of the most potent issues around the effectiveness of REDD+ in reducing emissions or enhancing forest carbon storage were expressed around issues of additionality, leakage, and permanence (26, 27). *Additionality* refers to the risk that payments for reduced emissions might be provided for reductions that would have occurred even without payments. To address the risk that REDD+ will not generate additional emissions reduction, it is necessary to establish a baseline emissions rate for a given region or country and to ensure that emissions reductions subsequent to payments are below the baseline and are motivated by the payments. *Permanence* refers to the risk that current emissions reductions may be offset via higher levels of deforestation and degradation in the future. Continuing monitoring of terrestrial emissions is therefore necessary to ensure that payments are made only for permanent emissions reductions. Finally, *leakage* refers to the risk that emissions reduced in one location might simply be shifted to another location through higher levels of deforestation there. Again, reliable global monitoring is necessary to ensure that emissions are not transferred spatially to other locations.

More recently, a number of studies have questioned the adequateness of the opportunity cost approach—used widely to estimate the costs of implementing REDD+ projects to sequester carbon—as the basis for assessing the money that should be paid to forest owners, managers, and users not to deforest (28). In tropical forests where there is illegal logging and/or side payments, property rights are ill defined and/or ill enforced, information about forests' use and management is patchy, and incentives to change political and policy contexts are limited, the opportunity cost approach may be inappropriate (4). In general, a number of considerations must be taken into account if opportunity cost estimates are to be anywhere close to the costs of implementing REDD+ projects and policies. These include consistency across methods to estimate costs, costs of policy reforms, development of new carbon-trading mechanisms, and market uncertainties facing many landholders in tropical countries for products derived from alternative uses of land (29, 30). As Börner et al. (6) highlight for the Brazilian Amazon, even if the incentives provided through REDD+ reduce deforestation in some areas on purely economic grounds, missing institutional preconditions and political considerations are likely to play an equally important role in the success of REDD+.

There is also little evidence that national governments will use opportunity cost assessments as the basis of their REDD+ programs and planning. Appraisals of REDD+ costs consistently underestimate—or omit—the economic benefits of reducing deforestation and forest degradation, as well as the advantages

of successful REDD+ programs in attracting private investment and improving access to commodity markets. For example, many agricultural commodity markets are beginning to exclude from their supply chains producers who deforest. REDD+ programs could become an important mechanism for nations to maintain or increase their farmers' access to such commodity markets. The most relevant costs for nations that are preparing for REDD+ are related to the programs that are needed to achieve reductions in emissions and enhancement of forest carbon in a sustainable and equitable manner, and these costs can be far below the full opportunity costs associated with foregone profits from deforestation-dependent activities (31).

REDD+, Biodiversity, and Ecosystem Services

Rising optimism about the possibility of REDD+ initiatives delivering positive conservation results was tempered by the Copenhagen COP outcomes in 2009. The COP to the Convention of Biological Diversity held in Nagoya in 2010, however, expressed faith in the ability of REDD+ to deliver positive results. The optimism was resurrected to some extent with the success at Cancun in December 2010, but the specifics of the debate have not changed much in the absence of clarity regarding the level of funding. At present, the substantial funding that may be sparked by REDD+ for forest conservation and management and the emergent hybrid structure of future REDD+ implementation mean that the implications of REDD+ efforts for conservation cannot be ignored. This is particularly so because international funding flows for conservation have stagnated in the past decade, and at the same time, funding for reducing forest-related emissions has risen substantially. The specific effects of REDD+ initiatives on biodiversity are likely to be a function of how nation-states and other actors choose among different forest-use and land management options to gain carbon credits. These can range from reduction of deforestation, reduction of selective logging (or damages associated with conventional forms of selective logging), regeneration and restoration of native forests, and new tree plantations (32–36).

Most of these changes have a neutral or positive impact on biodiversity. They can also lower the risk of deforestation-induced rainfall inhibition (37), regulate hydrological flows (38), protect aquatic ecosystems (39), conserve soils and nutrient cycles, and lower risks of forest fires (9, 31). If REDD+ leads to the replacement of low-carbon density native forest, savanna, and grassland ecosystems with high-carbon density monocultures of tree plantations to sequester carbon rapidly, then negative impacts on biodiversity and ecosystem services are likely (9). A balanced appraisal of the impacts of tree plantations, in particular, needs to take into account the state of the ecosystems where tree planting is located, the kind of trees that are planted, the ways in which they are planted, and the role of plantations as habitat for native species (40, 41). But ensuring that ecological cobenefits are delivered effectively requires attention to tenure, standards, stakeholder participation, and equity in the design of REDD+ efforts (42–45).

In this context, there is a growing body of evidence that, in the medium to long run, there will be a global land shortage owing to rapidly expanding demands for food, fiber, feed, timber, fuel, and emissions reduction (46–48). Many different processes are articulating the pressures from competing demands for land and land acquisition, particularly in the global South (49). Since the mid 1990s, literally hundreds of millions of acres of arable land has passed into the hands of absentee owners in Latin America, Africa, and Southeast Asia (50–53). The impending land shortage on a global scale will inevitably create a push for intensified uses of land to meet competing demands, and the shortage is already pushing agricultural frontiers into tropical rainforest regions (48, 54).

Long-term success of REDD+ requires that lessons of contemporary decentralized approaches are integrated systematically into a

more global architecture for REDD+ and that effective policy responses to ensure cobenefits are put in place. Such policy responses can take advantage of developments and opportunities that are already available. Opportunities, such as the shift in agricultural expansion from the temperate to the tropical latitudes, include the recent development of agricultural commodity "roundtables," i.e., global certification systems that exclude farmers whose agricultural practices include forest clearing, illegal labor exploitation, and use of banned agrochemicals (55–57). In the long run, if REDD+ succeeds and slows the rate of tropical forest conversion to agriculture, large increases in yields per hectare in tropical latitudes will be necessary to meet global demands. Failing such increases, a substantial shift in agricultural production to more temperate regions or large food shortages are likely outcomes.

REDD+, Local Peoples, and Indigenous Communities

Debates around REDD+ have generated a vigorous literature on its possible impact on local communities dependent on forest resources, with special attention to indigenous peoples. One section of this scholarship shows cautious optimism that REDD+ can generate substantial cobenefits in the form of local employment and cash incomes, if designed appropriately (58, 59). Much of this literature, however, has raised serious concerns. Scholars focusing on indigenous peoples and local communities have questioned the extent to which they will share in benefits from REDD+ schemes (24, 60). The distribution of tenure rights over carbon and access to forests are critical for benefit sharing, and both are likely to be crucial to the ability of local populations to gain benefits from the increased value of carbon. The emphasis on tenure rights for improved benefits from resources has also been highlighted by other analysts and for many types of resources, including carbon and forests (61–65). Indeed, tenure rights are often only the first step, because without the implementation and enforcement of provisions that bestow rights, communities will still likely be left out of the REDD+ process or be affected negatively (24, 64).

In response to ongoing international negotiations, a substantial part of the REDD+ literature has suggested mechanisms and strategies through which to safeguard the interests of local, indigenous, forest-dependent groups. These recommendations run the gamut from opportunities for participation by local peoples to greater transparency and better access to financial benefits (58, 66, 67). Larson (64) argues that there is little reason to expect local communities to benefit from REDD+ without a binding international agreement to protect local rights, an argument supported directly and indirectly by many others. Lyster (60) has identified several existing international legal instruments—the Rio Declaration on Environment and Development, the United Nations Framework Convention on Climate Change, the Convention on the Conservation of Biological Diversity, the United Nations Declaration on the Rights of Indigenous Peoples, and the Convention Concerning Indigenous and Tribal Peoples in Independent Countries—through which the rights of indigenous and local peoples can be safeguarded. By contrast, scholars have also pointed to the potential strengths of local communities vis-à-vis central governments in reducing deforestation and forest degradation under the right conditions, such as in effective monitoring and enforcement as well as in the design of measurement, reporting, and verification protocols under REDD+ (65, 68). Little attention has been paid by REDD+ analyses to the safeguards that are designed into the international agricultural commodity roundtable certification systems.

The rapidly expanding scholarship on the subject notwithstanding, systematic evidence on outcomes resulting from the involvement of local communities and indigenous peoples in REDD+ projects continues to be rare. Thus, there is little empirical evidence on synergies and trade-offs between carbon sequestration and other potential cobenefits of forest protection and regeneration (61, 69) under different

forms of tenure and management. Moreover, the manner in which the implementation of REDD+ initiatives influences and can be influenced by existing development policies, programs, and projects is only now beginning to get some traction in the literature (70, 71). But informed policy choices for designing and implementing REDD+ require knowledge in both these arenas.

ACTORS AND THEIR INTERESTS IN REDD+

Existing and proposed REDD+ efforts can be viewed along a variety of organizing themes. The existing literature differentiates between REDD+ policies and projects, among projects at various scales and for different objectives, and in terms of the major actors charged with implementation responsibilities. In addition, when drawing lessons relevant to future REDD+ efforts, one can distinguish between projects tied tightly to REDD+ goals and others that are more generally about afforestation and reforestation (72, 73). In the ensuing discussion, we focus on the actors involved with REDD+ efforts broadly—distinguishing among government, market, and civil society actors and recognizing the many instances where actors from across these domains collaborate on specific REDD+ initiatives.

The growing global interest in REDD+ was expressed vividly during the Copenhagen climate summit of 2009, and consolidated further in the Cancun agreement in 2010, when an ecosystem service (carbon storage in tropical trees) became for the first time the focus of intense international debates involving government, private, and civil society actors. Developed nations are interested in REDD+ as a cost-containing measure for achieving emissions reduction targets. National governments of many developing nations view REDD+ as a way of participating in international climate negotiations and as a source of revenue; many are designing programs to participate in the emerging REDD+ regime. International and national conservation nongovernmental organizations (NGOs), private companies, organizations of agricultural producers, as well as federations of forest-dependent communities and indigenous peoples are designing REDD+ pilot projects. National governments and private investors in developed countries are financing most of these projects. In addition to these actors who are directly involved in the development of REDD+ programs and projects, others have become indirectly engaged in REDD+ because they see it as a potential threat to their agendas. These actors include those involved with food security, rural poverty alleviation, human rights, and biodiversity conservation.

International and National Initiatives

REDD+ has evolved to accommodate the broad range in institutional capacity in developing nations. Some countries, exemplified by Brazil, have very high institutional capacity, strong forest conservation programs, and formal recognition of indigenous land rights. At the other end of the spectrum, exemplified by the Democratic Republic of the Congo, are countries with lower institutional capacity, weaker forest conservation programs, and insecure claims on land and forests by indigenous people. The Cancun agreement, which was based largely on the Norway Government's "*Reducing Emissions from Deforestation and Forest Degradation (REDD): An Options Assessment Report*" (74), describes three phases of REDD+ implementation depending on national capacity to participate in REDD+. Most importantly because there is no funding available under REDD+ at present, the Cancun agreement urges developed countries to finance phase one and phase two activities in developing countries.

In the first phase, governments develop the institutional capacity to design REDD+ strategies through stakeholder dialogue, institutional strengthening, and demonstration activities. REDD+ provides fast-track funding to carry out this planning and institutional strengthening. Most developing nations participating in REDD+ are in phase 1. The second,

intermediate phase of REDD+ is characterized by a fund-based instrument that provides access to predictable REDD+ finance using agreed upon criteria. In this phase, the national government in the developing country accesses REDD+ finance on the basis of results that are not necessarily tied to emissions reductions. Brazil, Guyana, Indonesia, and Tanzania are currently engaged in this type of funding, all from the Government of Norway. In the third phase, the national government is ready to participate in performance-based funding, in which flows of REDD+ revenues are directly tied to measured and verified changes in GHG emissions from deforestation, forest degradation, and forest carbon enhancement. No nation has reached phase 3.

Three multilateral processes have been designed to provide funding for developing nations that are interested in phase 1 of REDD+. These processes have been constrained by institutional mandate in the types of activities that can be supported and the actors that can be engaged. Most significantly, they are designed to engage national governments almost exclusively and have been limited in their ability to work with civil society actors or subnational governments. The World Bank's Forest Carbon Partnership Facility (FCPF) was launched in 2007, has attracted $180 million in commitments from donor nations to support "readiness" activities in interested nations (phase 1), and will provide carbon finance in excess of $100 million during its second phase to a smaller group of nations (75). Thirty-seven nations were approved for phase 1 support. The FCPF provided only small grants ($200,000 maximum) for nations to prepare their requests for readiness funding and larger grants for REDD readiness. The program disbursed little money until 2010 when it allocated $40 million. The FCPF's carbon finance program, which would initiate performance-based financial flows within a subset of nations participating in the FCPF, has not yet been launched.

The United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD) is a partnership of the UN Environment Programme (UNEP), the UN Development Programme (UNDP), and the Food and Agriculture Organization (FAO) of the UN (76). It provides twelve developing nations with direct readiness support (phase 1). UN-REDD was established through an $82 million grant from the Government of Norway. Finally, during the Copenhagen COP 15 in 2009, some developed nations committed $4 billion to REDD+ for the 2010 to 2012 period, subsequently formalized through follow-up meetings in Oslo and Paris. The "Paris-Oslo Partnership" or the "Interim REDD+ Partnership" is a multilateral process involving 58 donor countries and developing nations operating outside the UNFCCC ambit, with very limited participation by civil society organizations and civil society actors. Many donor nations have little flexibility in the ways in which their overseas development assistance (ODA) is disbursed, and much of the funding committed within the partnership will probably be a reallocation of existing ODA commitments.

The Government of Norway has led creative efforts to fund a broad range of initiatives, both directly and through multilateral processes. In addition to funding for the FCPF, UN-REDD, and the Paris-Oslo Partnership, Norway together with developing country partner governments has designed large-scale performance-based bilateral REDD grants in which continued disbursement of funds is conditional on demonstrated progress in slowing deforestation. Norway's performance-based commitment to Brazil was made following two important announcements by the Brazilian government: the creation in 2006 of a tropical forest fund to receive donations from developed countries to defray the costs of slowing Amazon deforestation and a decision, announced in 2008, to reduce deforestation in the Amazon by 70% by 2017. Norway responded with a $1 billion commitment to be disbursed through 2015 as Brazil demonstrated progress toward its deforestation target (31). Similar agreements have now been made

with Indonesia and Guyana (77). These performance-based donations represent an important inflection point in environmental finance globally in which the flow of funds is conditional upon demonstrated progress. They are now the only initiatives that fall within phase 2 of the REDD+ framework (74). Norway's influence upon REDD+ extends to central Africa, where it was the main donor in support of the Congo Basin Forest Fund that provides readiness funding for members of the Central African Forests Commission. Norway also provided phase 1 support to Tanzania and Mexico and has issued grants to civil society and research institutions in support of measurement, reporting, and verification activities; readiness; and policy aspects of REDD+. Norway is joined by Australia, the United Kingdom, Germany, and the United States, which have also provided some support for the REDD+ readiness process.

Many developing nations have taken important steps to participate in REDD+, although only a few have moved to phase 2 implementation measures to reduce deforestation. Brazil provides the most vivid example of the potential for REDD+ to achieve emissions reductions from deforestation while securing the control of land and forests by indigenous people. From 2005 to 2009, deforestation in the Brazilian Amazon declined 64% below its 10-year average (31). This remarkable decline puts Brazil ahead of its official deforestation reduction target and can be attributed, in part (approximately one-third), to the increase in forest area under protection as indigenous lands or nature reserves since 2004 (78). One-fourth of the Brazilian Amazon is formally protected as indigenous territories that have an inhibitory effect on deforestation equal to that of parks and nature reserves. Brazil also demonstrates the need for REDD+ programs to address the drivers of deforestation. More than 40% of the decline in deforestation in the Brazilian Amazon through 2006 can be explained as a result of diminishing returns on forest conversion to soy and cattle pastures (31, 78). Conversely, if the rising prices of food commodities and the global shift of agricultural expansion into the tropical latitudes continue as anticipated (46, 56, 79), deforestation rates could rebound in the Brazilian Amazon.

As Brazil implements its National Climate Change Policy (NCCP), which establishes a nationwide GHG emissions reduction target of 36% to 39% by 2020, the importance of effective programs to address the drivers of deforestation will become much greater. The NCCP will achieve most of its emissions reductions through an 80% and 40% reduction in deforestation in the Amazon and Cerrado regions, respectively. The Cerrado region, which supports extensive savanna and woodland vegetation, is the South American breadbasket and figures prominently in the plans of Brazil's agriculture ministry to increase the area of crops and livestock production 40% by the year 2018 (80). It is important to note as well the lag times between REDD+ finance and impacts on deforestation processes. Grants from the Norway-funded Amazon Fund, administered by Brazil's National Development Bank, were issued in 2010 and have yet to influence deforestation dynamics. Thus far, none of the Amazon Fund grants directly address the drivers of deforestation. In this regard, the recent launching of a US$1.37 billion package of low-interest loans for low-emission agriculture and livestock production (81) is one of the earliest examples of the interministerial policy refinement and alignment that will be required for REDD+ to succeed.

Many scholars have argued (1, 82) that the long-term sustainability of REDD+ will depend upon the development of a market that links emissions-reducing private and public sector programs with GHG–emitting companies that must reduce emissions to comply with cap-and-trade regulations. The advantage of regulated carbon markets is that they can potentially deliver finance more efficiently and at a greater scale than ODA funding, which is vulnerable to political swings and bureaucratic inefficiencies (83). The major disadvantage of regulated carbon markets is that they may commodify forest carbon in a way that

displaces or excludes communities that have unclear tenure rights to land, forests, or carbon (43).

The shortest pathway to a regulated REDD+ carbon market may be via an initiative that has brought together states and provinces from developed and developing nations. In 2008, Governor Arnold Schwarzenegger launched a process for developing a link between REDD+ and California's Assembly Bill 32: Global Warming Solutions Act, which caps future emissions of GHG emissions and permits regulated entities to trade emission allowances (18). The resulting "Governors' Climate and Forest Task Force" (GCF) has now grown to include 16 states and provinces, including 3 states in the United States (California, Wisconsin, Illinois) and 13 states and provinces in developing countries [Acre, Amazonas, Para, Mato Grosso, Amapa (in Brazil), Aceh, Papua, East, West and Central Kalimantan (Indonesia), Cross River (Nigeria), Chiapas and Campeche (Mexico)] (31). These subnational units contain one-fifth of the world's rainforests, and some of them have developed sophisticated, state-wide REDD+ programs that are supported by ecosystem service laws, and wall-to-wall land-use zoning plans (84, 85). A process is now under way to create a formal linkage between California's Assembly Bill 32 and the REDD+ programs of Acre and Chiapas.

The GCF and the 2010 agreement between California, Acre, and Chiapas provide an important example of how REDD+ could harness the climate change policies of developed economies to transform the rural development trajectory of a developing region in a way that lowers emissions from land-use change. Many fundamental questions remain, however, about this emerging architecture. It is still unclear, for example, how future revenues from demonstrated emissions reductions will be allocated among federal and state governments as well as whether the reductions that are achieved as part of formally announced "nationally appropriate mitigation actions," such as Brazil's NCCP, will qualify as international offsets (85). In one proposal that is gaining traction within Brazil, Amazon-wide emissions reductions for REDD+ would be divided among federal (e.g., Amazon Fund) and state-level (e.g., Acre's Sistema de Incentivos para Servicos Ambientais, which means Incentive System for Environmental Services) on the basis of three criteria: historical emissions, progress in achieving state-level emissions reduction targets, and total forest carbon stocks (86). This design builds upon the "stock-flow" allocation system proposed by Cattaneo (44). The success of the GCF will depend upon a resolution of these and other questions, and the successful design of the state-level sector-specific programs and policies to provide a system of incentives and law enforcement that achieves the emissions reduction targets even as it improves the livelihoods of economically marginalized rural populations.

Market Actors and Efforts Related to REDD+

In contrast to national- and international-level REDD+-related negotiations and agreements where provision of funds has mostly been for capacity building and actions conforming to specified policy criteria (rather than being tied to demonstrated emissions reductions), market-based exchanges of funds for carbon credits have been occurring for more than two decades. Relatively few exchanges have occurred for REDD+ projects, but afforestation and reforestation projects have been part of the carbon market for the past five years (87). Because REDD+ is a mechanism that aspires to direct monetary transfers and compensation to those who successfully reduce carbon emissions, and also because the potential market for terrestrial emissions-based carbon credits is huge, market actors are likely to play a substantial role in the future success of REDD+.

The global carbon market can be divided between compliance and voluntary markets. Compliance markets rely on international and national legislation and agreements for emissions reduction and include the European Union's Emissions Trading Scheme and the Clean Development Mechanism. Voluntary

markets are based on decentralized demand for carbon offsets and allow individuals and companies to purchase carbon credits to signal their desire to reduce carbon emissions—whether for philanthropic or reputational reasons. The recently closed Chicago Climate Exchange and voluntary over-the-counter carbon credit sales are examples of voluntary markets. The size of voluntary carbon markets is a fraction [≈1%, 94 million tons of carbon dioxide equivalent (Mt CO_2e), US$387 million] of the compliance markets in terms of the globally traded volume (8,700 Mt CO_2e) and value of transactions (US$1447 billion) (87). The size of the compliance markets and that of the aggregate global market increased in 2009 over 2008. But that for voluntary markets declined substantially—by nearly 50% in terms of value—and may be even lower in 2010 owing to the closing of the Chicago Climate Exchange and unclear regulatory signals, particularly in the United States.

Carbon markets are set to play a critically important role in REDD+ particularly because of their role in setting standards related to effective carbon sequestration and REDD+ cobenefits, but also because of the signals they provide to decision makers about land acquisition and use (83). For REDD+ projects to qualify for tradable carbon credits, for example, they will need to conform to standards that are broadly acceptable to buyers of carbon credits. Even as national and international regulatory actors are developing guidelines for what these standards should be, two project-level standards are broadly accepted in the voluntary carbon market—the Voluntary Carbon Standard (VCS, now called the Verified Carbon Standard) and the Community Carbon and Biodiversity Standard (CCBS). The VCS is concerned mainly with carbon sequestration and does not take into account ecological or social cobenefits as part of its set of criteria. The CCBS, by contrast, does take cobenefits into account and provides guidance to include community and biodiversity concerns regarding forestry and other land-based project designs. Terrestrial carbon projects with VCS- and CCBS-certified credits enjoy a premium of US$10–$20 in the voluntary carbon market. These standards provide information about the different dimensions of desirable trajectories of emissions reduction and, therefore, are likely to become important as governments seek to reduce terrestrial emissions in conjunction with community interests and biodiversity protection. However, these project-based standards have not yet been expanded or incorporated into jurisdiction-wide state- and national-level REDD+ programs that would work through policy alignment and regional land-use planning. Such standards are currently under development by the VCS.

As REDD+-related emissions reductions are incorporated more tightly into the compliance carbon market, and regulatory uncertainty about the fate of terrestrial carbon credits declines, it is likely that the size of the carbon market will increase substantially. This will occur both because industrial sector actors will look more aggressively for cheaper strategies to offset carbon emissions and because suppliers of terrestrial carbon credits will look for the most cost-effective ways to provide such credits. REDD+ and forestry projects designed for the voluntary carbon market that provide multiple cobenefits have often been called boutique abatements (88) or boutique carbon (89). With a growing demand for cheaper sources of carbon credits, the segment of the carbon market likely to expand the most may be the one in which social and ecological cobenefits receive lesser attention. As future REDD+ credits are sold via the carbon market, the dimensions and objectives of REDD+ projects likely to be favored by buyers are greater efficiency in implementation and assured sequestration of the carbon that the credits represent. At the same time, there is heightened concern that allowing REDD+ credits to be traded in carbon compliance markets, such as the European Emissions Trading Scheme, is undesirable on two counts. First, this will defeat the purpose of a "cap" in the cap-and-trade schemes. Second, it will lead to lower overall emissions reductions, which is contrary to the spirit of UNFCCC. Alternatively, REDD+ could allow nations to

take on more ambitious emission reduction targets since it reduces the costs of achieving these targets.

Anticipated expansion of the carbon market and the integration of terrestrial carbon credits into the market are at least partially responsible for the "global land grab" described by a number of recent studies (90, 91), although transnational and private purchases of land for food production and residential purposes are no small part of the process (49). Without legal and procedural mechanisms in place to protect local rights, livelihoods, and access to resources, the structural pressures for land transfers to more efficient uses are likely to translate into substantial levels of exclusion of poorer households and forest users. To prevent REDD+ initiatives from being tarred with the same brush, it is particularly important that national governments incorporate stronger safeguards protecting the interests of poorer resource-dependent populations in the context of terrestrial emissions reduction efforts.

In sum, governmental policy frameworks will become increasingly important for achieving the potential cobenefits and avoiding negative impacts of REDD+ interventions and for carbon markets to realize their potential of reducing emissions. Indeed, without strong government action to limit aggregate allowable emissions, carbon markets will at best generate economic efficiency gains for given quantities of emissions rather than reducing overall emissions. Regrettably, few national governments at present are ready to exercise the responsibility of limiting emissions.

Civil Society Actors and REDD+

REDD+ has catalyzed a global network of civil society actors over the past decade. This loose set of actors has become increasingly active in policy debates concerning the structure and content of REDD+ projects, policies, and international negotiations. In particular, global civil society actors have put forth a steady stream of gray literature that has served to highlight problems in the design and implementation of emerging REDD+ design and thereby have even influenced some of the provisions of these REDD+ policies on the interests of indigenous peoples, community rights, and biodiversity. This network encompasses national associations of community groups and NGOs [Federation of Community Forestry Users of Nepal (FECOFUN)], regional alliances (Coordinating Body of Indigenous Organisations of the Amazon Basin), as well as global organizations (Center for International Forestry Research, World Rainforest Movement) and coalitions (Via Campesina, Rights and Resources Initiative). In spite of the amplified voice of civil society actors in REDD+ debates, scholarship on the subject has tended to focus almost exclusively on the potential adverse impact of REDD+ projects on forest-dependent communities in tropical countries and the roles of community institutions in mitigating such adverse impacts. Assessments of the contributions of civil society actors remain rare.

Civil society actors have been the most influential and have had the greatest impact in bringing attention to the role of forest tenure and property rights in mediating the impact of REDD+ projects on local communities. Even as REDD+ gained prominence in international negotiations through the first decade of the twenty-first century, civil society actors forcefully emphasized tenure and rights of local communities and indigenous peoples around the world (62, 63, 90). Through active and vociferous participation in COPs, from Montreal in 2005 to Cancun in 2010, civil society actors have succeeded in inserting specific clauses to that effect into successive declarations emanating from each such meeting. In fact, this heightened awareness of the role of forest tenure contributed to the evolution from REDD to REDD+ over the course of the past few years. Largely because of the efforts of civil society actors, protection of existing rights of local communities and indigenous peoples over forests must be included in all REDD+ projects and policies.

In addition to highlighting the potential adverse impact of unclear property rights

on the ability of REDD+ to benefit local communities, civil society actors have also played an important, albeit less successful, role in advocating for stronger local community involvement to meet the objectives of REDD+. There are two broad arguments in favor of local communities: (*a*) the efficiencies in articulating existing policies with REDD+ schemes and goals (68); and (*b*) the livelihoods, equity, and democracy-related cobenefits of involving local communities (63, 92).

The first of these relates, in particular, to the community-based forest management efforts and decentralization policies that swept across developing countries through the 1990s (93). In different forms and with varying degrees of success, local communities have been incorporated into forest protection and management in more than 60 countries covering close to 300 million hectares of forests. In some cases, this has taken the form of transfer of ownership over forests, such as indigenous reserves in the Amazon basin (94) and communal forests in Tanzania (95). In most countries, however, it has taken the form of comanagement or collaborative management, whereby central forestry agencies retain ownership of the forest resources but devolve management duties to user groups at the community level. Research on these efforts provides useful insights for local-level REDD+ efforts (61, 96, 97). Although a substantial part of the existing work on REDD+ remarks on how civil society actors—particularly communities and NGOs—can contribute to and/or benefit from REDD+ initiatives, there are relatively few results from actually implemented REDD+ projects and policies, and even fewer existing analyses are based on results from community-based REDD+ projects (72).

Civil society actors across the range from the local to the global have worked together to bring greater attention to the increasing integration of global markets for food, fuel, fiber, and other commodities, as well as to the implications of this integration both for the success of REDD+ projects and the well-being of local communities and the forests on which they depend for their livelihoods (98). At regional and national levels, civil society coalitions have worked to highlight the positive role played by smallholders in maintaining and improving forest cover in developing countries. A primary actor in this process has been the expanding regional networks of social movements under the global umbrella of Via Campesina (99). Starting in Central America, Via Campesina has spread to sub-Saharan Africa and South and Southeast Asia in the past decade, bringing the voices of smallholders into national and regional debates. Similar roles have been played by national-level actors, such as FECOFUN. FECOFUN has been instrumental in bringing the voices of forestry user-groups to national debates, particularly in the context of negotiations for assistance for REDD-readiness and REDD+ projects through the World Bank's FCPF (100).

International conservation organizations have also been active in REDD+ debates, although the conservation community appears to be divided over whether REDD+ presents an opportunity or a threat to biodiversity conservation. The large international conservation organizations have been united in their opposition to the expansion of biofuel plantations through forest conversion but have refrained from taking clear positions on the role that REDD+ could play in protecting biodiversity. The International Union for Conservation of Nature has gone the furthest in endorsing full protection of the rights of local communities and calling for the need for reforms in forest management in developing countries that include clarification of forest tenure and equitable sharing of benefits with local communities. The World Wildlife Fund, the Nature Conservancy, and Conservation International have initiated REDD+ pilot projects in several countries (including some that predate REDD+), but they remain focused on the need for an international architecture for REDD+ and for financing through a global cap-and-trade system. Indeed, there are some signs that REDD+ is becoming a central feature of the business models of these organizations.

As that happens, some conflicts of interest between their organizational interests and an effective REDD+ may surface. When REDD+ programs are implemented by subnational and national governments, the role of international NGOs as project developers will diminish, potentially eliminating or reducing an important revenue stream for them.

A Crosscutting Theme: Monitoring Carbon

The progress of REDD+ within international negotiations and the GCF has been supported by advances in the ability to monitor forests and forest carbon. These advances have overcome an important obstacle to the inclusion of avoided deforestation in the Kyoto Protocol (101). Most tropical nations have yet to acquire high-resolution maps of their forests for even a single date, but this remarkable deficiency will soon be rectified. Direct measurement of deforestation with satellite imagery is now routinely conducted by several government agencies and has been operationalized in government-run forest monitoring systems in Brazil and India (Global Observation of Forest and Land Cover Dynamics, GOFC-GOLD, 2009). A global forest monitoring system could be established in which aboveground forest carbon stocks are measured periodically using airplane-mounted laser technology (i.e., light detection and ranging, LIDAR), as recently demonstrated for the Peruvian Amazon region (102). The Peruvian Government has implemented a LIDAR system and is now mapping, at high resolution, its entire Amazon forest formation. Radar technology has also taken an important step forward with the Advanced Land Observing Satellite (ALOS) phased array type L-band synthetic aperture radar (PALSAR) satellite mission of the Japanese government (103). ALOS PALSAR provides cloud- and smoke-free imagery of the world's forests annually and is providing the first high-resolution images of forests in the many tropical nations that have persistent cloud cover. The scientific community has organized processes that could systematize the provision of forest cover data to tropical nations, for example, through the Group on Earth Observation (104), which coordinates satellite data dissemination. Ultimately, better monitoring systems could permit the inclusion of additional types of terrestrial carbon, such as soil organic matter, in REDD+ and other systems for incentivizing low-emission land-use strategies.

With these advances in monitoring capacity, attention must now focus on some of the other challenges that need to be surmounted if REDD+ is to realize its potential. For example, there is an emerging consensus that REDD+ will operate across several scales and jurisdictions ranging from nationwide to subnational governmental jurisdictions to geographically delimited pilot projects. These multiple levels of REDD+ program development must be integrated within nested frameworks that define reference levels consistently across scales and that allocate incentives effectively across scales to maximize the likelihood of achieving both emissions reductions targets and cobenefits for livelihoods and biodiversity (85). In this sense, REDD+ could become the first sectoral approach to climate change mitigation and the basis of a new paradigm in rural development that lowers carbon emissions as it advances biodiversity conservation and improved livelihoods of economically marginalized rural communities.

Enhancing REDD+ Outcomes: The Importance of Collaborative Approaches

The foregoing discussion shows that an actor-centered approach helps brings out some of the key issues relevant to the differences in ongoing REDD+ initiatives. Where governments and official agencies are concerned, these issues include the critical roles of forest and agricultural policy change and institutional capacity building, as well as the continued importance of international negotiations and support for a REDD+ mechanism that includes the development of monitoring technologies to establish baseline and reference levels for carbon. In relation to market actors, the discussion shows their fundamental role in mobilizing official

Table 1 Performance of government, market, and community actors and their efficacy in forestry initiatives

Actors	Implementation efficiency	Livelihood improvements	Carbon sequestration	Biodiversity conservation
Government actors	Low	Medium	High	Medium/high
Market/private actors	High	Low	High	Low/medium
Community/civil society actors	Medium	High	Medium	Medium/high

and private funds to support a REDD+-based market in carbon credits and the basic role of standards and certification in assuring buyers that they are purchasing credits for real emissions reduction and doing so without harming community interests and biodiversity conservation. The discussion of civil society actors in relation to REDD+ highlights the importance of equitable tenure arrangements for forests and carbon, as also of participatory strategies that allow REDD+ monetary and nonmonetary benefits to reach forest-dependent communities and households.

At the same time, the discussion also shows that, in practice, the different tasks associated with the creation and implementation of a future REDD+ mechanism are likely to require collaboration across the actors and agencies interested in enhancing carbon, biodiversity, and livelihoods outcomes. Without national government support and international assistance, problems of monitoring, additionality, and leakage are going to be exceedingly difficult to solve. Without the widespread involvement of market actors, financing for REDD+ is likely to suffer major shortfalls and bureaucratic inefficiencies. And local-level REDD+ initiatives have the clear advantage of close involvement of actors responsible for project implementation.

Indeed, this lesson about the way forward for REDD+ closely parallels lessons from decades of research on forest governance. The early stage and long time frames of REDD+ interventions, the inexactness of carbon measurement science, and the limited evidence on social and ecological outcomes of REDD+ projects and policies mean that direct evidence on REDD+ results is unavailable. But an assessment of earlier forestry policies and projects along dimensions of efficiency, livelihoods, carbon sequestration, and biodiversity conservation can still be useful for future REDD+ efforts. **Table 1** above provides such a preliminary assessment.

Recognizing that, in practice, most forestry projects and policies involve multiple actors and that different actors are often responsible for specific forest governance tasks, the table nonetheless summarizes a general conclusion in the literature on forest tenure ownership: None of the major actors relevant to forest governance is likely to perform uniformly well along all the dimensions of desired REDD+ outcomes. Therefore, if decision makers are interested in efficiency of implementation, local livelihoods, carbon sequestration, and biodiversity conservation, entrusting REDD+ to specific actors might lead to substantial trade-offs. However, efforts to promote complementarity of interests and capacities among government, private, and community actors may help achieve multiple objectives that REDD+ efforts have come to symbolize for different stakeholders.

Because tenure over forests consists of a number of different rights that can often be separated (105), it is easy to imagine hybrid governance arrangements in which communal actors may have the rights to access, use, and manage forests, but the rights to exclude other users and to transfer the resource might be vested in government agencies. Contemporary decentralization policies are very often such mixtures of tenure rights. Analogous combinations of rights in which governments and market actors collaborate to pursue carbon sequestration as

well as benefits for communities can also be imagined and, indeed, are being pursued. The success of such mixed approaches is likely to determine whether the REDD+ mechanism meets the expectations of different stakeholders.

CONCLUSIONS

The rich literature on REDD+ and the exploding volume of forthcoming analyses make it clear that even within the next few years current understandings of the promises and pitfalls of REDD+ will be rewritten. This review constitutes no more than a step in the yet to be written history of an enormously promising and simultaneously risky approach to reconfigure forests, the structure of interests and stakes in forests, and forest governance. Nonetheless, the available evidence and information about existing REDD+ policies, projects, and trajectories suggest five issues as important points of departure for future work.

This review has identified four of them as overarching trends within the emerging REDD+ regime. First, the era of "stand-alone" forest carbon projects appears to be fading. In its place is a new emphasis on projects and programs for which pathways to regulated forest carbon markets exist. In many instances, this signifies the need for hierarchical, nested REDD+ architectures in which pilot projects are components of jurisdiction-wide state- and province-level programs, which are, in turn, nested within national programs. One reason for this shift is that the task of determining emissions baselines, and of assessing and addressing leakage and permanence issues, has proven to be exceedingly difficult at the project level. A second reason is that many forest carbon pilot projects initiated over the past 15 years have not yielded credits to their investors nor have they provided evidence of actually lowering carbon emissions.

A second trend highlighted by this review is related to the first: a shift in focus to incorporate the lessons provided by the scholarship on rural development, poverty alleviation, and resource governance. The early years of REDD+ design have focused on technical issues, funding mechanisms, national capacity building, and safeguards against adverse impacts. The success of REDD+ in moving forward may depend increasingly on its ability to effect systemic changes in public policies (including those for agriculture, transportation, energy, and mining) to address the drivers of deforestation and the delivery of public services (education, health, law enforcement, and others) that are essential components of low-carbon rural development. REDD+ has the potential to become a new paradigm that merges the agendas of environmental conservation and rural development, but the realization of this potential depends upon an expanded role for rural development and poverty alleviation specialists, as well as improved integration of lessons from past policies and projects concerned with development, resource governance, and conservation into the design of future REDD+ initiatives.

A third trend is the tropical agricultural "revolution" (56) that is increasing the profitability of forest conversion to crops and livestock and could make it difficult for developing nations to achieve their deforestation reduction targets or, for that matter, to protect forested ecosystems and related services. Climate change permitting, if the increase in food, fuel, fiber, and feed production needed to supply growing global demands comes from tropical nations such as Brazil, it will be difficult to find land on which carbon can be sequestered. Pressure will grow to convert forests and savannas to meet demand. In conjunction with other competing claims for land, the demand for food, fuel, and carbon, in particular, is likely to keep both land and food prices high. Another aspect of the tropical agricultural revolution that poses challenges to the REDD+ agenda is the increasing frequency of food shortages and social unrest that accompanies food price spikes (47). Forced to decide between expanded food production and forests, governments may turn their backs on their REDD+ commitments.

Fourth, it is likely the case that there are no blueprints by which REDD+ can be

implemented in all countries and locations. One-size-fits-all approaches are as unlikely to work for REDD+ as has been the case for reducing deforestation, conserving biodiversity, and sustaining development. Diversity in legal frameworks; variations in social, economic, demographic, cultural, and political contexts; and different rates of change in ecosystems and social systems cannot be influenced through uniform policy shifts without tremendous costs and unanticipated consequences. This means that governments implementing REDD+ policies and actors involved in REDD+ projects must be willing to collect evidence about project and policy outcomes and then use such evidence to revise their policies and projects.

Finally, we emphasize the need to learn from available lessons of policies related to REDD+. Although it is necessary to recognize that rigorously collected data and systematic analysis of REDD+ impacts will take time, available information on successes and failures of past forestry policies, determinants of deforestation and forest regrowth, and factors that explain success of forestry and conservation projects at multiple scales can be used productively for the initial design of REDD+. Using available evidence obviates the need to reinvent the wheel. More importantly, it can help show how competing hopes and stakes in REDD+ can be reconciled so that carbon does not become the enemy of the poor or of species at risk.

SUMMARY POINTS

1. REDD+ is a financial incentives-based strategy to compensate national governments and subnational actors for demonstrable reductions in carbon emissions from deforestation and forest degradation and enhancements of terrestrial carbon stocks.
2. REDD+ is the most advanced component of climate change negotiations within the UNFCCC and has attracted several billion dollars in commitments from developed nations. However, the prospects for a new international climate treaty for 2013 and beyond have receded.
3. REDD+ has attracted substantial attention from scientists, politicians, decision makers, the private sector, and civil society organizations interested in climate change, emissions reduction, biodiversity conservation, and rural livelihoods.
4. Achievement of carbon emissions reduction goals of REDD+ is threatened by the problems of additionality, permanence, and leakage; additional concerns include illegal logging, corruption, ill-defined property rights, and competing demands for food, fiber, and energy.
5. Technological concerns related to low-cost carbon monitoring of REDD+ are being addressed through ongoing advances in remote sensing technologies.
6. Civil society organizations have raised important concerns about the equity and livelihoods impacts of REDD+ interventions, and have made these issues key areas of REDD+-related negotiations.
7. A project-based approach to REDD+ is giving way to hierarchical approaches in which pilot projects are components of jurisdiction-wide state- and province-level programs, which are, in turn, nested within national programs.
8. In light of the different and complementary strengths of market, civil society, and government actors, successful REDD+ outcomes are likely to require collaborative institutional arrangements in which all three sets of actors are involved.

FUTURE ISSUES

1. The early years of REDD+ design focused on technical issues, funding mechanisms, capacity building, and safeguards against adverse impacts. The future success of REDD+ will depend on systemic changes in public policies including those for agriculture, transportation, energy, and mining; addressing the drivers of deforestation; and the delivery of public services such as education, health, and law enforcement because these are essential components of low-carbon rural development.
2. Available knowledge on successes and failures of past forestry policies, determinants of deforestation and forest regrowth, and factors that explain success of forestry and conservation projects at multiple scales can be used productively for designing REDD+ interventions at multiple scales.
3. One-size-fits-all approaches are as unlikely to work for REDD+ as has been the case for reducing deforestation, conserving biodiversity, and sustaining development. This means that governments implementing REDD+ policies and actors involved in REDD+ projects must engage in adaptive policy making by collecting evidence about project and policy outcomes and using such evidence to revise existing policies and projects.
4. In the absence of a unified global price for carbon, positive incentives for reducing terrestrial GHG emissions are likely to emerge through a fragmented pluralistic process. An important challenge for the scientific community, civil society, market actors, and policy makers is the development of innovative institutional mechanisms, financial instruments, and public policies that enable cohesion across the diversity of pathways to reduce emissions.
5. Tropical nations are on the horns of a dilemma where REDD+ is concerned. They are being drawn into an agricultural revolution because they have substantial potential to convert forests and woodlands to cropland and pasture and thereby expand food, fiber, fuel, and feed production to meet rapidly increasing global demand. This expansion runs counter to the participation of tropical nations in the emerging REDD+ regime and related REDD+ carbon payments.

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