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Essay

Biodiversity and REDD at Copenhagen

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Reducing carbon emissions through slowing deforestation can benefit biodiversity best if countries implement sensible policies.

The 190 countries that are party to the UN Framework Convention on Climate Change (UNFCCC) are negotiating the successor to the Kyoto Protocol and hope to complete it in Copenhagen in December 2009. This 'Copenhagen Agreement' expects to directly involve developing countries in slowing global warming via a mechanism to reduce carbon emissions caused by deforestation. The premise of REDD (Reduced Emissions from Deforestation and Degradation) is that tropical forest countries would be compensated if they reduce their rates of deforestation and thus their emissions of greenhouse gases. During the negotiations, REDD has expanded in scope and now includes the sustainable management of forests and the conservation and enhancement of forest carbon stocks. By default, it should have multiple benefits. Unfortunately, the final rules could safeguard carbon stocks but nonetheless fall short of their potential to protect biodiversity [1] — concerns reiterated in the Marburg Declaration by leading tropical biologists [2]. We explain the reasons for this and then suggest how careful policies can avoid harm to biodiversity.

REDD's potential advantages are easily stated. Tropical forests contain half of all carbon stored in terrestrial vegetation [3], and clearing and degradation of tropical forests constitutes 18% of all anthropogenic carbon emissions (~1.4 Gt carbon per year) [4]. Yet only afforestation and reforestation are included in the Kyoto Protocol. REDD can greatly strengthen UNFCCC measures to reduce carbon emissions, protect biodiversity, and provide other human benefits.

Reduced deforestation should have many other benefits. Forests provide essential ecosystem services on which many poor people depend. Tropical forests contain the majority of the world's rapidly vanishing indigenous cultures and its peoples living in voluntary isolation [5]. REDD could also slow the loss of biodiversity — important in itself and in its central contribution to ecosystem services [6]. Over half of all species live in tropical forests and are under threat from deforestation [7]. Many species are also threatened with extinction from global climate disruption [8], and may well be additional to those lost from deforestation [9].

These additional benefits may not accrue if REDD rules are poorly designed and implemented. We now explore why this could happen and suggest how to prevent it.

Design

If REDD emphasizes reducing deforestation rates, then governments and market forces will likely focus on areas of threatened forest that are cheapest to protect. The Marburg Declaration expressed concerns that biodiversity 'hotspots' might not be cost-competitive [2]. Biodiversity loss concentrates in hotspots which, by definition, have both high numbers of endemic species and high levels of habitat loss [10]. Tropical moist forest hotspots retain only ~10% of their original forest [10] and have high rates of human population growth [11]. Protection costs will be much higher than for forest elsewhere — such as the Amazon, where at present ~85% of the forest remains. Time scale matters, for at present rates of deforestation, extinction rates in even the relatively intact forests — such as the Amazon — will soon match those in the hotspots [7].

If REDD also emphasizes forests with the greatest density of carbon, these too may not be the most important for biodiversity conservation. While some hotspots have high stocks of carbon, others do not, and not all are forests [10]. Geographical scale matters, however. At the scale of hotspots (which sometimes cover several countries) and of individual countries themselves, carbon density and conservation needs correlate poorly [12,13]. At smaller, experimental scales, increased diversity increases biomass and productivity [14].

Between these are within-country scales. Land prices, opportunity costs, and carbon density vary considerably from place-to-place — as they do for reforestation projects [15] — so there will likely be opportunities to reduce carbon emissions from deforestation that are also biodiversity-friendly [16].

Another concern is 'leakage', whereby deforestation processes are not effectively abated by REDD but simply displaced to other areas. Site-specific conservation projects could save forests locally, but displace deforestation elsewhere. For instance, the establishment of forest reserves in the Peruvian Amazon contributed to forest degradation and clearing increasing in adjacent areas by 300–470% [17]. REDD policies are intended to minimize leakage by requiring emissions from deforestation to be reduced against national or large regional baselines, but risks remain. Recent modeling suggests that up to 95% of reductions in one country may be leaked as increased degradation in others [18]. So implementing REDD might accelerate the conversion and degradation of high-biodiversity areas where REDD or other conservation funding is not available [1].

Finally, REDD might cause some nations to backslide on their environmental legislation, thinking that they might become eligible for more REDD funds at some point in the future. Central to UNFCCC rules is the concept of 'additionality' — credit can only be given for new actions, not ones already taken. Indonesia, for instance, recently removed its legislation prohibiting clearing of peat-swamp forests, and some suspect that the prospect of future REDD funding played a part in this [19].

Implementation

The Parties to the UNFCCC are currently split on whether to finance REDD through carbon markets, or to use either public funding or voluntary private funding to provide payments to governments. Potentially huge sums are involved — $20 billion could cut emissions by 0.5 Gt C — making REDD an inexpensive solution relative to alternatives such as industrial energy efficiency or solar or nuclear power — and do so by 2020 [20].

Under one option, governments would receive direct payments for securing a target reduction in deforestation rates below a reference level based on existing rates. Some worry that developing countries with limited human and financial resources might focus on protecting carbon-rich forests to meet their REDD targets, even if this undermines other ecosystem services and social welfare. (Experience in public administration in some developed countries like the UK shows that meeting targets can sometimes lead to the neglect of other essential public services [21].) Decades of forest policies and conservation practice suggest that REDD-financed initiatives to slow deforestation rates will only be successful if they create socially viable and economically attractive alternatives to land conversion.

Market-based approaches trade credits for reducing emissions from deforestation for a price per ton of carbon. They would inherently value forests only for their carbon, ignoring other ecosystem services. Paying more for reducing emissions in biodiversity-rich forests than for reductions in biodiversity-poor forests is unfortunately not likely to work and could create perverse incentives. If credits for reducing emissions are to be sold as offsets in carbon markets, then buyers — industrialized country companies that want to use these credits to cover some of their emissions — will seek out the lowest prices. From the buyer's perspective, when they buy emissions permits in the market, a ton is a ton, whether from a high- or low-diversity forest.

The Parties could counter the limitations of market-based approaches by separating payments for biodiversity, made using non-carbon market financing, from payments for reduced emissions originating in market transactions. This would mobilize the power of private carbon markets to pay for the emission reductions, yet discourage low-price, low biodiversity schemes. Suitably combined payments for carbon and biodiversity could promote both simultaneously.

Promotion of biofuels under the UNFCCC could deal a serious blow to the effectiveness of REDD in protecting forest carbon and biodiversity. It is now apparent that clearing tropical forests to establish biofuel feedstocks — especially intensive crops such as oil palm, soy and sugarcane — not only increases net emissions and reduces biodiversity but makes REDD less economically competitive except in remote or agriculturally marginal areas that are under the least threat [22].

Yet under UNFCCC incentives, there is still a strong possibility that biofuel crops could greatly expand in low-carbon ecosystems and degraded forests, which if left alone would recover to their natural state. These are the areas where, in the absence of strong counter-measures, REDD-related leakage may intensify land conversion.

Compartmentalization

In the latest text of the Copenhagen Agreement, the Parties are undecided about whether to include specific rules to protect biodiversity when designing REDD schemes, or to assume that protecting biodiversity is a co-benefit that will happen automatically [23].

One reason for this is political compartmentalization. At the UN Conference on Environment and Development in 1992, the UNFCCC was given responsibility for combating climate change and the UN Convention on Biological Diversity (UNCBD) was given responsibility for protecting biodiversity. They also function in different ways [24]. The UNFCCC has developed an increasingly complex set of rules (especially under the Kyoto Protocol), while the UNCBD adopts a 'softer' regulatory stance [25]. The two conventions communicate via a Joint Liaison Group that shares information between their secretariats. In 2004, the UNCBD and UNFCCC agreed on a Joint Work Programme. The UNCBD's rules, however, are too weak to require Parties to forego any UNFCCC actions that could damage biodiversity [25].

Divisions among biologists may reinforce compartmentalization. Some focus on forest carbon, others on biodiversity. This helps explain why carbon sequestration studies pay only limited attention to their biodiversity impacts. The journal *Mitigation and Adaptation Strategies for Global Change,* for example, has published just one paper with 'biodiversity' in its title [26], and this is representative of a general neglect of this issue [27]. While many papers cover the impacts of climate disruption on biodiversity, only a few consider the impacts of climate-change mitigation on biodiversity, or how to integrate management of carbon and biodiversity [27].

Solutions

The Copenhagen agreement needs to reach political agreement on swift and deep reductions of greenhouse gases. Nevertheless, it need not neglect biodiversity and other benefits. This can be achieved by four main actions:

- First, rules to conserve biodiversity should be included in the text of the Copenhagen Agreement. Biodiversity conservation should not be assumed to be an automatic 'co-benefit'. We recommend that national implementation standards for REDD include biodiversity-inclusive environmental impact assessments [28]. The UNFCCC does not have a mandate to protect biodiversity, but mitigating climate change should not harm biodiversity. The Parties have already implicitly recognized the importance of 'conservation' in moving from REDD to REDD+, though this only refers in practice to conserving carbon stocks. These changes will simply extend this to ensure that conservation explicitly includes biodiversity. The Parties could go further and include financial support to sustain existing protected areas or establish new ones as part of the overall financial package for reducing emissions under REDD+.

- Second, the UNFCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA) should ask the IPCC to explicitly include assessment of the biodiversity and ecosystem service impacts of mitigation alternatives in all future reports of Working Group III. Moreover, they should convene a joint working group of conservation biologists and 'carbon ecologists' to produce a Technical Paper describing a feasible method for optimal co-management of carbon and biodiversity ecosystem services.
- Third, the Parties to the UNFCCC should invite the Parties to the CBD to consent to make cooperation on the biodiversity impacts of climate-change mitigation a priority item in their joint work programme.
- Fourth, the SBSTA should also ask the IPCC to report any evidence of transnational leakage. If it occurs on the scale that some modelling suggests [18], it would undercut the carbon as well as the biodiversity benefits of REDD. The U.S. Waxman-Markey bill [29], the European Commission [30], and many countries in the UNFCCC negotiations [23] propose to use non-market funds — foreign aid, government revenues from auctioning pollution permits, private donations, and so on — to pay for "stabilization" of forests in countries (such as Suriname) with large forests and low deforestation rates that are not eligible for REDD carbon market funds under guidelines now proposed. This would be an important counterweight to international leakage.
- Finally, while we want REDD to "do no harm" to biodiversity and want to maximize the positive biodiversity impacts of REDD policies, we do not expect this single mechanism to fully address all tropical biodiversity funding priorities. The considerable amount of private conservation funding could be redirected and focused on forests of high biodiversity value that would not otherwise be eligible for REDD funding.

Biodiversity, itself, is essential to ecosystem adaptation. Ensuring that REDD policies not only reduce carbon emissions but conserve biodiversity will ensure that humanity and the biosphere can be as resilient as possible to climate disruptions.

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