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Can Carbon Trading Save Vanishing Forests?

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Among the many nasty things that humans are doing to the environment, few rank worse than destroying tropical forests. Rainforests sustain an astonishing diversity of species, and they are vital for keeping our planet livable—they limit soil erosion, reduce floods, maintain natural hydrological cycles, and help to stabilize the climate. Yet around 13 million hectares of tropical forest are destroyed every year—the equivalent of 50 football fields a minute.

If we hope to rein in global warming, the last thing we should do is raze tropical forests. Destroying these forests dumps vast quantities of greenhouse gases into the atmosphere—roughly one-fifth of all human carbon emissions, more than the entire global transportation sector. Further, tropical forests, which copiously transpire water vapor into the atmosphere as they photosynthesize, are major drivers of cloud formation. Clouds cool the planet by reflecting solar energy back into space, and they also sustain regional rainfall, which limits destructive forest fires. Undisturbed tropical forests may even be a major carbon sink, according to some studies, with Amazonia alone absorbing perhaps two billion tons of carbon dioxide each year. Hence, saving a hectare of tropical forest does far more to reduce global warming than does saving a hectare of temperate or boreal forest (Bala et al. 2007).

In recent years, many scientists have advocated carbon trading as a way to slow tropical deforestation. The idea, known as "REDD" (reducing emissions from deforestation and degradation), is simple in concept. Under international agreements such as the Kyoto Protocol, participating nations agree to reduce their carbon emissions below a certain level. Nations that struggle to meet their emissions target can buy carbon credits from other countries that either have no target (as is currently the case for developing nations) or that produce fewer emissions than allowed. Like any tradable commodity, the price of carbon credits is largely determined by supply and demand.

In theory, everyone should win with REDD. Wealthy nations could pay to help slow deforestation as part of an overall effort to meet their emissions target. Protecting an imperiled forest in Peru, for instance, might lead to the same net reduction of carbon emissions—and be considerably cheaper—than retrofitting a coal-fired generating plant in Ohio. In a transaction like this, dangerous carbon emissions are reduced, a biologically rich forest is protected, and Peru gains direly needed foreign revenues. For such reasons several influential studies, such as the widely heralded Stern Report in the United Kingdom, have advocated REDD as a vital and cost-effective strategy for slowing global warming. In any effort to slow harmful climate change, tropical forests are the low-hanging fruit.

Moving forward

If REDD is such a great idea, why was it not implemented sooner? The first attempt to install REDD, as part of the Kyoto Protocol in 1997, met with surprisingly intense opposition. European green groups feared that wealthy nations like the United States would simply buy their way out of their international obligations to permanently cut their burgeoning emissions. Others argued that forest conservation was a risky and uncertain strategy for battling greenhouse gases. For example, even though one might try to slow deforestation by establishing a new national park in Malaysia, "leakage" could occur if slash-and-burn farmers simply move to other areas and continue destroying the forest. Finally, Brazil, which alone contains a third of the world's tropical forest, adamantly opposed REDD and lobbied other developing nations to do likewise. In Brazil, as in many countries, national sovereignty issues are extremely sensitive, and the Brazilian Foreign Ministry feared that long-term commitments to protect forests could potentially limit its future development options.

Fortunately, the situation changed dramatically at the recent climate conference in Bali, with REDD finally getting a green light. This resulted from, as much as anything else, the resolute efforts of an alliance of small, forest-rich countries, led by Papua New Guinea and Costa Rica, known as the Coalition for Rainforest Nations. The coalition had made important strides at the Montreal climate accords two years previously, where it secured permission to explore the feasibility of REDD. Bolstered by technical and financial support from the World Bank and many scientists, the coalition countries helped to carry the day in Bali. Indeed, it was the coordinator of the coalition, Kevin Conrad of Papua New Guinea, who successfully challenged the foot-dragging US delegation during a critical impasse to "lead, follow, or get out of the way"—words that reverberated around the world.

By skillful negotiation, the coalition countries managed to circumvent some of the biggest concerns about REDD. Those worried about the "leakage" issue were mollified when the coalition proposed to tally deforestation at the

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national level. Thus, if a carbon-offset project slowed deforestation in one part of, say, Cameroon, but simply allowed it to increase elsewhere in the country, Cameroon would receive no benefit. In addition, the fact that the coalition was led by developing nations helped to surmount fears that carbon trading would seriously limit their future development options. Finally, European environmental groups have grown increasingly alarmed by the acceleration of greenhouse gas emissions, particularly with China and India now joining other leading industrial nations as major polluters. Simply from a climate-change perspective, the green groups realized, failing to address tropical deforestation was dangerously irresponsible.

Challenges for REDD

Few now doubt that REDD will advance, but technical hurdles remain. For a developing nation to qualify for carbon credits, it must first establish its baseline rate of carbon emissions from deforestation, and then show that is has reduced its emissions below that rate. This requires data on current and past rates of forest loss, as well as field inventories to estimate how much carbon is stored in its forests. Remote sensing is the most feasible way to estimate deforestation rates, with high-resolution Landsat imagery being freely available since 1990. Rapid progress is now needed in several areas, such as devising a standard protocol for measuring deforestation rates and independently verifying those estimates (Gibbs and Herold 2007), and acquiring better data on carbon emissions from logging and forest degradation (Asner et al. 2005).

In the near term, developing nations will need financial and technical support to monitor past and current deforestation, and to limit future deforestation. The World Bank has provided $300 million for REDD-demonstration projects in developing nations, with a third of this earmarked for surmounting technical challenges. The World Bank initiative is being funded by several European nations, Australia, and Japan, and it is embarrassing that it has received zero support from the United States. Access to free or low-cost satellite data is also crucial for REDD, and a big concern is that the US Landsat fleet is rapidly aging, with no plans for replacement. Unfortunately, the Bush administration has neglected vitally needed Earth-observation satellites while backing its exorbitantly expensive, manned mission to Mars.

While REDD could be a boon for forests, it also raises important policy questions. For instance, although rapidly deforesting nations such as Brazil and Indonesia could benefit greatly from carbon trading, how does one reward an environmental leader such as Costa Rica, which is actually gaining forest cover? Under the current scheme, Costa Rica would gain nothing, because its baseline deforestation rate is zero. Further, to what extent will REDD protect endangered biodiversity? Purely from a global-warming perspective, the most efficient way to reduce greenhouse gases is to focus on big countries such as Brazil, Peru, Indonesia, and the Democratic Republic of Congo, which account for the lion's share of deforestation. But the most imperiled species persist in tiny forest remnants in nations such as Madagascar, the Philippines, and the Brazilian Atlantic forests. Protecting these scraps of forest would do little to slow global warming, although certain donors might pay a premium price for carbon credits in these hotspots of biodiversity. Finally, how can one ensure that the land rights of indigenous groups—which were very vocal at Bali—will be protected under carbon-trading schemes?

Conclusions

REDD is becoming a reality, and in many ways it is a model of how environmental scientists can help to effect policy on an international stage (Gullison et al. 2007). Many challenges remain, however, and much vigilance will be needed to ensure that REDD initiatives are not swamped by technical obstacles or national self-interest. In my view, perhaps the greatest challenge for REDD is the prospect of a massive expansion of biofuels. Be it sugarcane, oil palm, soy, or jatropha trees, the tropics are the best place to grow biofuel crops, and the escalating demand for biofuels is creating an enormous incentive for converting tropical forests to farmland. This will drive up land prices and thereby reduce the attractiveness of REDD, and the massive carbon emissions from forest destruction could reverse any gains from REDD initiatives. As scientists, let us demand both sustainable energy and sustainable forest policies from our governments.

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