

Paying to save tropical forests could be a way to reduce global carbon emissions

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Wealthy nations willing to collectively spend about \$1 billion annually could prevent the emission of roughly half a billion metric tons of carbon dioxide per year for the next 25 years, new research suggests.

It would take about that much money to put an end to a tenth of the tropical deforestation in the world, one of the top contributors to greenhouse gas emissions, researchers estimate.

If adopted, this type of program could have potential to reduce global carbon emissions by between 2 and 10 percent.

The calculation is one of several estimates described by a team of scientists and economists this week in the online edition of Proceedings of the National Academy of Sciences. The calculations, based on three different forestry and land-use models, provide the best estimates so far of how much it would cost developed nations to participate in a program called "avoided deforestation" to reduce worldwide carbon emissions.

Under such a program, wealthy nations would help achieve reduced emissions globally by paying landowners in developing nations not to cut down wide swaths of forested land to make way for agricultural uses. Tropical deforestation, the cutting and burning of trees to convert land to grow crops and raise livestock, accounts for about a fifth of all human-caused carbon emissions in the world.

The research attaches estimated dollar amounts to each metric ton of

carbon that could be saved through avoided deforestation in Africa, Central and South America, and Southeast Asia.

Based on these estimates, the overall cost to buy carbon credits would be lower than what developed nations would expect to pay to reduce emissions through regulation of industry, transportation and energy sources, said Brent Sohngen, a study co-author and professor of agricultural, environmental and development economics at Ohio State University.

"Compared to other options, an avoided deforestation program would be relatively cheap and practical for the United States," said Sohngen, who developed one of three models used to calculate the estimates. "It would save American taxpayers money and provide a huge transfer of funding from one region of the world to another, giving developing countries a larger chunk of the world's economic pie to use as they see fit."

The three models used to calculate the estimates are called the Global Timber Model, developed by Sohngen; the Dynamic Integrated Model of Forestry and Alternative Land Use, developed at the International Institute of Applied Systems Analysis in Laxenburg, Austria; and the Generalized Comprehensive Mitigation Assessment Process Model, developed at the Lawrence Berkeley National Laboratory in California.

The models employ different economic and biological assumptions to reach their respective deforestation and carbon-emission projections. Each model takes into account changes expected to occur over time, especially incentives for deforestation relating to demand for agricultural land based on changes in population, income and technology.

"The results indicate that substantial emission reductions could be accomplished through 2030, the period we examined," Sohngen said.

For example, according to the models, carbon credits costing \$20 per metric ton would result in average global carbon dioxide emission reductions of between 1.6 billion and 4.3 billion metric tons of carbon dioxide per year. At higher prices, the emission reductions go up substantially. At \$100 per metric ton of carbon, the models predict an avoided deforestation program would yield emission reductions of between 3.1 billion and 4.7 billion metric tons of carbon annually.

Looking at a hypothetical program another way, the researchers used the models to estimate prices based on avoided deforestation goals. For example, the cost to achieve a 10 percent reduction in global deforestation through 2030, resulting in between 0.3 billion and 0.6 billion metric tons of reduced carbon emissions annually, would cost between \$2 and \$5 per metric ton of carbon credit – or between \$0.4 billion and \$1.7 billion per year. Achieving a 50 percent reduction in deforestation, and a corresponding 1.5 billion to 2.7 billion metric ton reduction in emissions each year, would cost \$10 to \$21 per metric ton, or between \$17.2 billion and \$28 billion per year, according to the model calculations.

By comparison, the United States emits an estimated 6 billion tons of carbon each year.

The researchers also estimated how per-ton carbon prices would translate into land rental prices in tropical regions. Carbon at \$2 per ton could translate into rental values of \$20 to \$35 per hectare per year, and carbon prices of \$10 per ton would trigger land rental values of \$85 to \$252 per hectare annually. A hectare equals the area of 2.5 acres. About 13 million hectares of land per year continue to be lost to deforestation.

"These payment levels could generate substantial financial flows to landowners who reduce deforestation," Sohngen said. "If this kind of program could stop deforestation, it would provide a bigger source of

biodiversity by retaining a larger stock of tropical forest, keep carbon out of the atmosphere, and provide money to people in developing countries to pursue new forms of livelihood that don't involve cutting down trees."

The avoided deforestation cost estimates could be used in negotiations toward an updated global program to reduce greenhouse gas emissions, similar to the Kyoto Protocol adopted in 1997 and subject to enforcement in 2005. The United States has not signed that treaty, which has been ratified by 182 parties, including 137 developing countries and 36 developed countries, plus the European Union.

The Kyoto Protocol included avoided deforestation as a potential method of reducing global carbon emissions, but "it just didn't pick up any steam at that time," Sohngen said. "There were lots of constraints within the Kyoto treaty about using land-use options to abate carbon emissions. It looks like there is a large effort now to try to relax some of those constraints in order to allow avoided deforestation to be considered as a carbon abatement mechanism."

In recent years, developing nations, especially Papua New Guinea and Costa Rica, have begun pushing for a program that would allow the purchase of carbon credits to preserve native forests.

"Now, there is a huge debate about it, and our paper is just trying to add one economic component to the discussion," Sohngen said. "If we're talking about the source of at least 20 percent of the world's emissions that can be cheaply abated, then why wouldn't we do it? If we don't spend the money to offer these countries development assistance, they're going to continue deforesting, so their emissions are just going to continue."

Source: Ohio State University

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