

# Copenhagen 2009:

## Could a Cap-and-Trade Market Combat Global Warming and Conserve Earth's Tropical Forests?

Harold Beedle and Bruce Calhoun

**As the world** increasingly comes to terms with the reality of global warming, international negotiators are struggling to work out the terms of a new climate change framework to be finalized this December in Copenhagen, Denmark. One aspect being discussed is a plan to compensate developing countries for reducing greenhouse gas emissions by protecting their tropical forests. Such a plan could go a long way towards saving the world's fast disappearing forests. This background essay and accompanying handout can help students learn more about the links between tropical forests and climate change, and ways global citizens can have an impact.

### Forests Under Attack

In the middle of the last century, forests blanketed the American tropics, Central Africa, Madagascar, Southeast Asia, and the Indonesian archipelago. They were the home to incredibly diverse life forms that biologists studied with enthusiasm. Pulitzer Prize winner E.O. Wilson, the world's leading ant expert, found 43 species of ants in one Peruvian tree (as many ant species as existed in all the British Isles). Terry Erwin, an entomologist for the Smithsonian Institute, identified 1,200 species of beetles in a single tree in Panama.

In addition to sheltering wildlife, tropical forests protect watersheds. They act as giant sponges that absorb rainwater in the rainy season and release it downstream during the dry season. The forests also provide food, medicine, fuel and building materials for millions of rural and indigenous people.

During the 1960s, these forests came under attack, slowly at first, and then with startling acceleration, as international loans and foreign aid from indus-

trial nations fueled widespread logging, ranching, mining, dam construction, and the building of roads into remote areas in the name of progress. Also, growing villages and cities consumed rainforest acreage for farming, firewood, and lumber.

The loss of tropical forests devastated aboriginal societies, damaged watersheds (which increased flooding and loss of topsoil), and destroyed the rich biodiversity that offered opportunities for discovering new pharmaceuticals. It burdened countries with large foreign debts, forcing them to continue selling off their natural resources to pay the interest on those debts. And—as scientists have recently determined—the destruction of rainforests accelerated climate change.<sup>1</sup>

### Citizen Action

Educators and students around the world were among the first to respond to this alarming trend. They mobilized across North America and Europe in 1988 and formed an International

Children's Network in 1991 which raised millions of dollars to purchase acres of endangered rainforest and to educate the general public about deforestation.<sup>2</sup> Many students and teachers also petitioned the World Bank and the International Monetary Fund to stop subsidizing “progress” in the tropics. As a result, Children's Rainforest Reserves were established, and in the early 1990s, subsidies that were driving deforestation were gradually discontinued.

Despite the Herculean efforts of indigenous forest peoples, conservationists, and some governments, rainforests continue to disappear at a breathtaking rate: 10.4 million hectares (25.7 million acres) per year between 2000-2005.<sup>3</sup> Today, subsistence farming and the burning of wood for fuel continue to drive deforestation in Africa. In Asia, forests are threatened by fires, logging, and palm oil plantations. In the Amazon, cattle ranches and soybean plantations are the biggest threats.

### Tropical Forests and Climate Change

Forests have four major roles with regard to climate change:<sup>4</sup>

1. They reduce greenhouse gas emissions by absorbing carbon from the air. Healthy forests have the potential to absorb about 10 percent of global carbon emissions projected

for the first half of this century into their biomass, soils, and products and store them, in principle, in perpetuity;

2. They emit greenhouse gases (mostly carbon dioxide, CO<sub>2</sub>) when destroyed. The clearing (often by burning), overuse, and degradation of mostly tropical forests contribute nearly 20 percent of total global emissions (more than pollution caused by cars, trains, and planes combined; see chart);
3. They produce wood fuel as a relatively benign alternative to fossil fuels when managed sustainably;
4. They react sensitively to a changing climate. Living systems (a variety of plants and animals) and non-living systems (such as water systems and soils) serve as indicators of subtle and long-term global changes.

### Sources of Greenhouse Gas Emissions

Power Generation.....	24%
Deforestation .....	18%
Transport.....	14%
Agriculture .....	14%
Industry .....	14%
Buildings .....	8%
Other energy related.....	4%
Waste .....	3%

Source: Forestry Commission of Great Britain, [www.forestry.gov.uk/forestry/INFD-79LL7T](http://www.forestry.gov.uk/forestry/INFD-79LL7T). See also IPCC, 2007.

Addressing the underlying causes of deforestation, fueled by a range of political, economic, and social factors, will require different solutions in different countries.<sup>5</sup> Stopping deforestation caused by the wood processing industry in Indonesia is a different challenge than halting a government-sponsored road project in the Amazon or stemming the production of cooking charcoal in Africa. A global approach would have to be flexible, allowing for varying on-the-



Evansville, Wisconsin, high school students explore the rainforest in Panama on a Save The Rainforest trip in 2008.

ground solutions in distinct tropical-forest nations.

### Copenhagen 2009

The 15th Conference of the Parties to the U.N. Framework Convention on Climate Change (UNFCCC) is slated for December 7-18, 2009, in Copenhagen.<sup>6</sup> This conference is the annual negotiating meeting of the countries that have ratified the 1992 UNFCCC.

A Copenhagen Protocol, which the meeting is expected to adopt, would succeed the 1997 Kyoto Protocol. While the Kyoto Protocol began to restrict pollution created by the burning of fuels in 2005 (at electrical power plants, in vehicles, in factories, etc.), it did not deal with tropical forest destruction as a source of greenhouse gases. Also, it was weakened when former president George W. Bush refused to ratify it.

Part of a new agreement could include provisions to compensate developing countries for protecting their rainforests through a mechanism called REDD: Reducing Emissions from Deforestation and Degradation. REDD is probably the last, best chance we have to save large tracts of the Earth's remaining tropical forests. It could—if properly framed and implemented—put us on the

path to reconciling forest stewardship with economic development.

### Cap-and-Trade Markets

There are several ways REDD could be funded. The largest source of funding would probably come from a cap-and-trade market, like the one now operating in the European Union for carbon emissions, or like that which reduced sulfur emissions under the Clean Air Act of 1990 in the United States.<sup>7</sup> A “cap-and-trade” is a market-based approach to reducing pollution. A cap-and-trade program first sets a cap, or maximum limit, on emissions. A participant has to purchase “credits” to emit a pollutant, with the total amount of allowances limited by the cap.<sup>8</sup> The money collected can be used to fund clean technology research, to provide grants or loans to participants who wish to replace dirty technology with clean, or to sequester (i.e., store) the pollutant in a safe place (e.g., as carbon is stored in trees and soil).

Over time, the total pollution allowed (or cap) is lowered. Credits gradually become more expensive. It is up to each participant to devise ways to reduce their need to purchase credits—and thus reduce the pollutants

they emit. Eventually, the actual amount of the pollutants in the environment is significantly reduced.

### Ready for REDD

How would a REDD cap-and-trade system help conserve tropical forests? Through REDD, developing countries would be eligible to receive funds from an international carbon trading market (ICTM) as an incentive to protect their forests. (This could begin in 2013, when a Copenhagen agreement would take effect.) The international carbon market would be the collection of markets in many countries.<sup>9</sup> ICTM would be run by all of the participating nations working through the UN. Signatory nations of the Kyoto Protocol already pay into the trading market at a rate of \$6 to \$54 for every ton of carbon emitted over their cap.<sup>9</sup> In the European Union, carbon market funds have been used to support such things as clean energy development and reforestation projects.

REDD could reward developing countries for their restraint—for not harming their tropical forests in any way—and for adding to their tropical forest reserves. REDD payments would compensate nations for the opportunity cost of not developing some of their natural resources. (See Handout on page 231)

To receive compensation, a country would have to establish its current (baseline) rate of deforestation and accurately monitor reductions. Third parties, such as UN agencies and scientific organizations, would monitor progress. New satellites with increased resolution and advanced software programs make verification quite possible, and the training of monitors is already in process.<sup>10</sup>

### Devil in the Details

Historical examples show that a cap-and-trade market can work, but there will be new challenges for the world community as it tries to factor tropical forest conservation into such a system.

## ONLINE RESOURCES:

### Tropical Forest Conservation and REDD

#### Save The Rainforest, Inc.

[www.saverfn.org](http://www.saverfn.org). Save The Rainforest, Inc., mobilizes students and teachers to protect rainforests through advocacy and volunteerism. It offers courses for school groups in Belize, Galapagos, Ecuador, Costa Rica, Panama and Mexico.

#### The Centre for International Forestry Research,

[www.cifor.cgiar.org/publications/pdf\\_files/media/MediaGuide\\_REDD.pdf](http://www.cifor.cgiar.org/publications/pdf_files/media/MediaGuide_REDD.pdf). “Simply REDD: CIFOR’s Guide to Forests, Climate Change, and REDD” is an excellent Q&A primer for this interdisciplinary subject and fast-developing issue.

#### Coalition for Rainforest Nations

[www.rainforestcoalition.org](http://www.rainforestcoalition.org). Through CRN, the tropical-forest nations advocated to get REDD on the agenda for Copenhagen 2009. Click on “Context,” and then on “Papers, documents” to find many good articles on rainforests, climate change, carbon markets, and the intricacies of REDD.

#### Countdown to Copenhagen: UN Framework Convention on Climate Change

<http://unfccc.int>. This is the official website of the upcoming December 2009 convention.

#### The Globe Program

[www.globe.gov](http://www.globe.gov). The Globe Program is coordinating a climate change research campaign that plans to involve 1 million students from around the world. Sponsors include NASA, National Science Foundation, U.S. State Department, and Colorado State University.

#### Nature & Culture International

[www.natureandculture.org](http://www.natureandculture.org). This is the website of an organization that is working on the ground in Ecuador and Peru to save tropical forest and promote the welfare of rural communities. Individuals can offset their carbon emissions by purchasing a half-acre or more of endangered forest.

#### Intergovernmental Panel on Climate Change (IPCC) of the United Nations

IPCC and UN Environment Programme publications have free pdfs with superb color graphics available through the UNEP information office:

- “Climate in Peril: A Popular Guide to the IPCC Reports,” [www.grida.no/publications/climate-in-peril](http://www.grida.no/publications/climate-in-peril)
- “Indonesian exports of forest products,” A case study. Search on the title at [www.grida.no](http://www.grida.no)
- “Forests working for the global climate: Reducing Emissions from Deforestation in Developing Countries,” Search on the title at [www.grida.no](http://www.grida.no)

#### Union of Concerned Scientists

[www.ucsusa.org/global\\_warming/science\\_and\\_impacts/impacts/global\\_warming-materials-for.html](http://www.ucsusa.org/global_warming/science_and_impacts/impacts/global_warming-materials-for.html). “Global Warming Materials for Educators” delivers key background information. For example, “Tropical deforestation accounts for about 20 percent of the world’s heat-trapping emissions, an amount equivalent to the emissions from China or the United States.”





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### 1. *How should REDD measure forest conservation?*

Although satellite surveillance can closely monitor the state of tropical forests on the ground, there are many details about measurement and verification that need resolving. Should monitors measure only reduced deforestation, or reduced forest plus degradation (the loss of some, but not all, trees to selective logging, for example)? Should we give credit for new forests planted? And there are gaps in the current guidelines that need correcting: nations are not required to report emissions from forest areas already designated as protected, but this means illegal logging or land clearance in these areas could go unreported.<sup>11</sup>

### 2. *How should REDD compensation be calculated?*

There are many fine points on the question of how funds should be allocated. For example, should compensation be given according to the absolute amount of forest being conserved or according to the amount that deforestation is being reduced? Suppose Country A has always conserved its rainforests, and it would like to be rewarded for continuing to do so. Country B is losing its rainforest at an alarming rate to slash-and-burn clearing by cattle ranchers seeking more land. It could use its funds to create alternative jobs for ranchers. How should compensation be apportioned in light of these different situations? Some countries argue that compensating for a reduced rate of deforestation would reward a country for its past exploitation. Some provisions to compensate countries that have worked hard to protect their forests may need to be worked out.

### 3. *Will REDD have enough funds to make a difference?*

Compensation under REDD would have to be on a scale sufficient to truly change the economic dynamics of deforestation. A U.K. report from 2008 estimated that \$10 billion to \$15 billion a year would be enough to reduce deforestation rates in half.<sup>12</sup> In comparison, the global carbon

market has been estimated to have generated more than \$100 billion in 2008.

### 4. *Can REDD prevent displacement of destructive activities to other ecosystems?*

As REDD begins to work successfully, human activities that destroy natural habitat and create greenhouse gases (such as cattle ranching and logging) might migrate from rainforests to savannas or temporal regions.<sup>13</sup> Funds would need to be awarded to promote green economic programs (to replace forest-based industries) in developing countries or to help forest industries re-tool or relocate in benign ways. All developing countries with tropical forests would need to participate in REDD, or deforestation activities would simply “leak,” as logging companies and others move to nonparticipating countries.

### 5. *Can a REDD regime make life better for humans as well as forests?*

The Coalition of Rainforest Nations was an early advocate for REDD. Citizens of forested countries, especially people who live in and around the forests, must be involved in creating, administering, and benefiting from REDD. Some groups, such as the Global Forest Coalition, feel they have not been properly involved in the framing of REDD and are protesting its inclusion in the new climate change agreement. They argue (as Country A did in the earlier example) that because they have already been conserving their forests they will not receive funds for continuing to protect their forests. They are also concerned that a top-down approach to administering REDD could disenfranchise them.<sup>14</sup> These types of concerns are being addressed in preparation for Copenhagen. The reality is that for reform to be sustainable, it has to have the support of local citizens.

### **Reasons for Hope**

REDD offers a plan for mitigation that requires no new technology for start-up and can produce immediate, impressive

results.<sup>15</sup> The successful implementation of REDD could benefit many of the 800 million people who live in the rural areas of tropical nations.<sup>16</sup> Funds from the international carbon markets would flow into communities that demonstrated good forest stewardship. The quality of local environments and watersheds would be maintained. Money could be designated for rehabilitating degraded environments and to seed sustainable development projects like Nobel Laureate Wangari Maathai’s tree-planting campaign in Kenya. In many damaged areas, soil-enriching leguminous trees could be planted and selectively harvested for wood. Beneath them, shade tolerant coffee and cacao could be cultivated. Ecotourism could be promoted. Solar, wind, and ocean tidal technologies could provide energy for everything from cooking to pumping freshwater from wells.

Cap-and-trade systems for reducing pollutants have a proven historical record of success. It’s not too much to hope that green economic activity, arising from the REDD system, might play a part in helping the nations of the world create a sustainable global economy.

### **What Citizens Can Do**

As in the early days of organizing to save the rainforests, we are hoping that once again citizen action can make the difference. First, we can learn more about the issues. Share the information in this article with your students and invite them to visit useful websites (See Box on page 229).

Second, teachers and students can go to Save The Rainforest, Inc., ([www.saverfn.org/](http://www.saverfn.org/)), and learn about an action campaign to include REDD in the new climate change agreement. When the hoped-for Copenhagen Protocol, with provisions for REDD, comes before the U.S. Senate for debate over ratification (possibly in 2010), teachers and students can voice their opinions to their senators.

Finally, in our own communities, we can spread the word that driving more

# Calculating Indonesia's Compensation for Rainforest Conservation

The United Nations now operates a successful “cap-and-trade” market for reducing carbon emissions from industries, power plants, and vehicles. This market could also reward developing nations for conserving their tropical forests (which store carbon) through a system called REDD (Reducing Emissions from Deforestation and Degradation). The UN Framework Convention on Climate Change (UNFCCC) could establish REDD in December 2009.

**What might the financial compensation be for a specific country like Indonesia, which has much of the Earth's remaining rainforests?**<sup>1</sup> Follow these steps to calculate one possible result.

- A. The present rate of deforestation in Indonesia is 2 million hectares (about 4.9 million acres) per year, much of it driven by the conversion of rainforest into palm oil plantations.<sup>2</sup> **If Indonesians can reduce this rate to 1.5 million hectares next year, then the amount of rainforest conserved would be \_\_\_\_\_ million hectares per year.**
- B. Write this amount as \_\_\_\_\_ hectares per year (by adding the correct number of zeroes).

- C. The average amount of carbon dioxide (CO<sub>2</sub>) released when one hectare of tropical forest is deforested is about 200 metric tons. **If Indonesia conserves its rainforest as described above, then it would reduce its emission of greenhouse gasses by \_\_\_\_\_ metric tons per year.**
- D. Let's assume that sequestered CO<sub>2</sub> is priced at U.S. \$10 per ton on an international carbon trading market established by REDD.<sup>3</sup> Let's also assume that REDD compensates nations directly for every ton of CO<sub>2</sub> sequestered. **Then REDD would pay Indonesia U.S. \$ \_\_\_\_\_ per year for working to sequester CO<sub>2</sub> by conserving its rain forests.**

## Notes

- Indonesia has about 82 million hectares of rainforest remaining in 2009, which is about 10 percent of the Earth's total.
- One hectare equals 10,000 square meters, or about 2.47 acres.
- The “carbon prices” on the “carbon markets” (e.g. the Chicago Climate Exchange, Europe's ETS) are actually prices per ton of CO<sub>2</sub>, or carbon dioxide, not carbon itself (the element C, which is a solid). Amounts are in U.S. dollars for the purpose of calculation. This is a low estimate for the price of CO<sub>2</sub>. As of May 13, 2009, the price of sequestered CO<sub>2</sub> in the European CO<sub>2</sub> cap trading system was \$22 per ton.

**Teacher Key** for “Calculating Indonesia's Compensation” A. 0.5; B. 500,000; C. 100,000,000; D. 1,000,000,000 or one billion U.S. dollars.



fuel-efficient cars, weatherproofing homes and buildings, and developing clean renewable energy are all important activities, but to mitigate climate change we will need to save the tropical forests. By spreading the word, educators and young people can promote support for including REDD in the new climate agreement, and assure its future ratification in the Senate. That would be a great legacy to pass on to future generations. 🌳

#### Notes

1. William F. Laurance, "A New Initiative to Use Carbon Trading for Tropical Forest Conservation," *Biotropica* 39, no.1: 20-24, 2007.
2. See the Rainforest Action Network (ran.org) and Children's Tropical Forests (www.tropical-forests.com/who-are-we) for a history of citizen action.
3. "Amazon Forest Still Shrinking Fast," at www.peopleandplanet.net, April 8, 2004.
4. The Centre for International Forestry Research, "Simply REDD: CIFOR's Guide to Forests, Climate Change, and REDD," www.cifor.cgiar.org/publications/pdf\_files/media/MediaGuide\_REDD.pdf. The carbon in trees' wood (most wood is just about half carbon, by weight) is oxidized to CO<sub>2</sub>, when deforestation takes place. This can be rapid, if the forest is burned, or slower, if the logs are left to rot.

5. "Roles of Forests in Climate Change" (UN Food and Agricultural Organization), www.fao.org/forestry/climatechange/en.
6. The home page is "Countdown to Copenhagen: UN Framework Convention on Climate Change," http://unfccc.int.
7. Read about carbon markets operating today at Chicago Climate Exchange (www.chicagoclimatex.com), the European Union (ec.europa.eu/environment/climat/emission/index\_en.htm), and the World Bank (www.worldbank.org. Click on Topics, then on FAQs "Climate Change." Scroll down to the question "What is the World Bank's role in the carbon market?")
8. "Clean Air Markets: Cap and Trade," www.epa.gov/airmarkets/cap-trade/index.html.
9. Legislators Forum, G8+5 Climate Change Dialogue, February 14, 2007, Paul Wolfowitz Remarks, available through www.worldbank.org.
10. Learn about technical verification at The Tropical Rain Forest Information Center, a NASA Earth Science Information Partner, www.trfic.msu.edu.
11. Lera Miles and Valerie Kapos, "Reducing Greenhouse Gas Emissions from Deforestation and Forest Degradation: Global Land-Use Implications," *Science* 320, no. 5882 (June 2008): 1454-1455.
12. The "Eliash Review" of October 2008, www.number10.gov.uk/Page17171; similar estimates were made by the Union of Concerned Scientists and the European Commission.
13. Miles and Kapos.
14. The Global Forest Coalition, "Forest Campaigners Reject Prince Charles' Rainforest Speculation Plans," (April 1, 2009), www.globalforestcoalition.org/news/view/158.
15. "Tropical Deforestation and the Kyoto Protocol," Marcio Santilli et al., www.edf.org/documents/4250\_CR\_eng.pdf
16. Kenneth Chomitz, "Independent Evaluation Group World Bank." Presentation in Oslo, September 29, 2008.

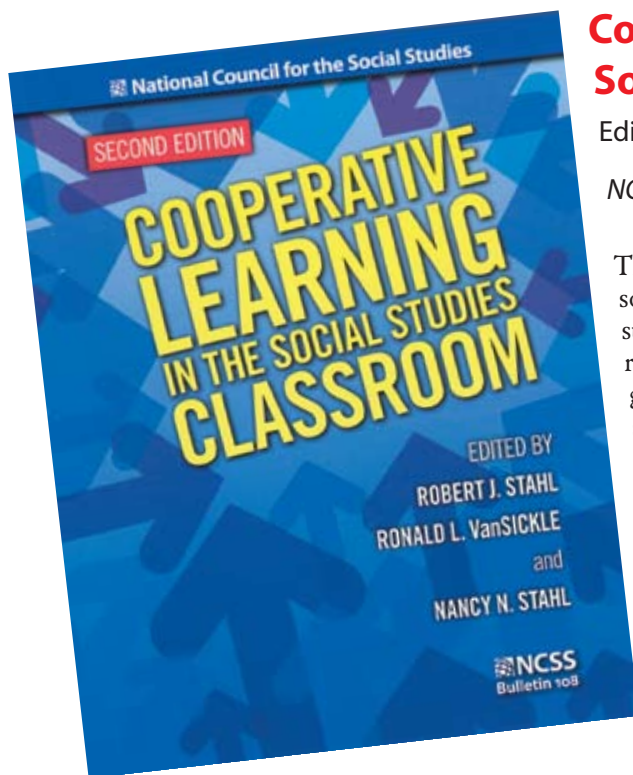
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## Cooperative Learning in the Social Studies Classroom

Edited by Robert J. Stahl, Ronald L. VanSickle and Nancy N. Stahl

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