



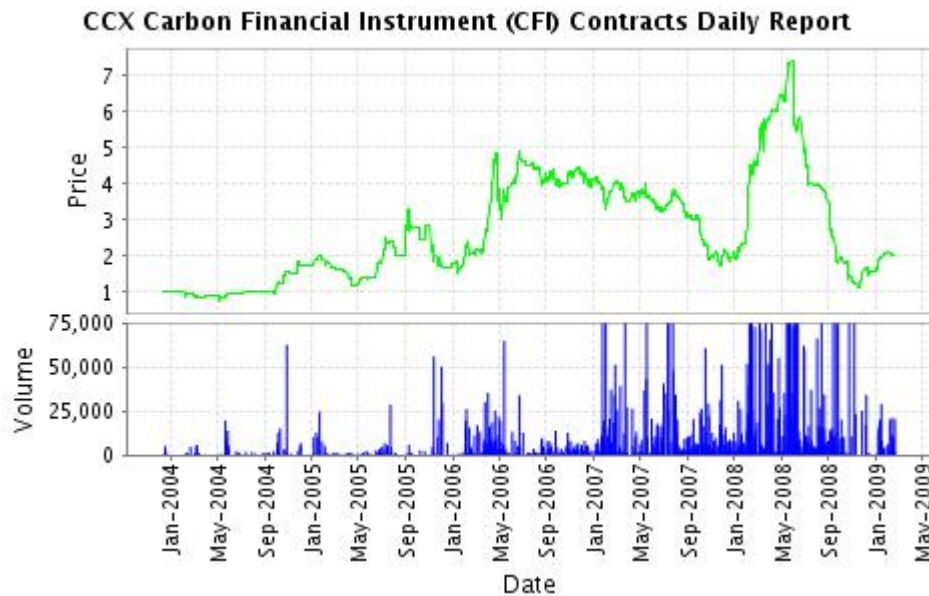
The Carbon Leakage Problem

By Josh McDaniel
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Forests absorb billions of tons of CO₂ globally per year, amounting to about 30% of all CO₂ emissions from fossil fuel burning. And so far, forests provide this service mostly for free. However, now that the creation of a mandatory carbon emissions cap-and-trade system has become more likely under the Obama administration, this freebie economic subsidy may be coming to an end.

Matt Hurteau, a forest ecologist with Northern Arizona University, thinks that may be good for forests.

Hurteau believes that the increased interest in managing forests for carbon sequestration may actually help drive a new approach to managing forests by giving forest owners economic incentives to reduce fire risk and create healthier, more resilient forests.



Price and volume of carbon trading in metric tons of carbon dioxide. Source: Chicago Climate Exchange

For years, forest owners have tried, with varying degrees of success, to create markets for the “carbon offsets” that their trees provide, and in recent years voluntary forestry offset programs have gained support from individuals wanting to reduce their carbon footprint, or from corporations trying to polish their green credentials. But, forestry offset programs, whether located in tropical rainforests or the California Sierras, have always been hamstrung by the impermanent nature of forests—they burn, they get attacked by insects, or they are simply felled. In the language of carbon traders, forests have a “leakage” problem.

“If you do something today that sequesters carbon, but over time the carbon leaks, you have to reconcile the short term benefits with the long term results,” says Bryan Mignone, a climate policy specialist with the Brookings Institution. “Any time you bring land use into climate policy, questions of leakage come up.”

Matt Hurteau believes the simplest way to resolve the question of carbon leakage in forests is to measure and quantify it, and include that in calculations of carbon storage potential of various forests.

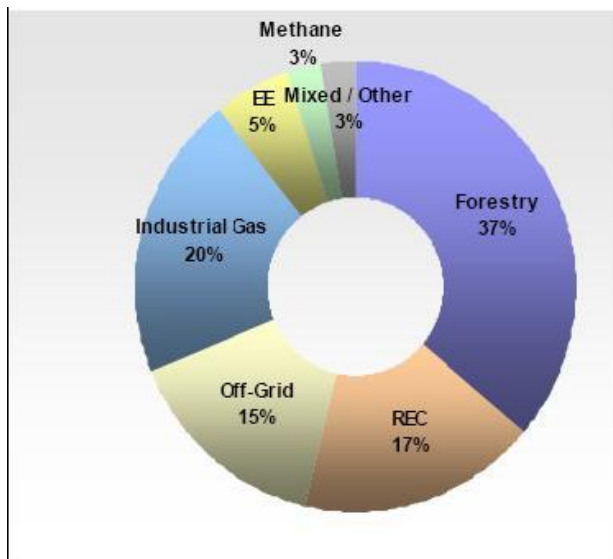
“If you want to claim a climate mitigation benefit from trees growing, then you need to account for carbon leaked from disturbance or management to get a complete picture,” says Hurteau.

Using computer models, Hurteau and Malcolm North, a USFS researcher with the Sierra Nevada Research Center, compared the carbon sequestration potential of Sierran mixed-conifer forests under different management regimes using combinations of burning, thinning, and basically leaving the forest alone. After a century of growth the unmanaged stands stored the most carbon, but when wildfires were thrown into the mix, most of their carbon inventory was thrown back into the atmosphere. If the forests were thinned before the fires, however, much less carbon was released when wildfires occurred in the modeling simulations.

“If you have a fire-prone forest and you thin the forest, the carbon stock is better protected,” says Hurteau. “With proper management, you can definitely affect potential emissions from wildfire.”

Forest Thinning and Carbon Credits

There are currently a number of regional systems and registries for reducing carbon emissions, including the California Climate Action Registry and the Regional Greenhouse Gas Initiative in the Northeast, that include forestry among their range of carbon offset options. If a national emissions cap was established these types of programs would surely multiply and expand rapidly as carbon producers looked for ways to make up for their emissions.



*Carbon offset transactions by project types.
Source: State of the Voluntary Carbon Markets, 2007*

In most forest offset systems, carbon value is established solely on basis of total carbon stored in forests minus any stock loss through harvest or management. Hurteau suggests that these programs should reward forest thinning with emissions-trading credits. The credits could provide millions of dollars needed to finance badly needed fuels reduction projects.

In places like the southwestern US with little to no market for the wood produced from thinning, carbon offsets could provide an income stream to

jumpstart fuels projects.

The real question is whether policy-makers or carbon traders would be open to a more complex accounting of forest carbon.

“Yeah, it is paradoxical that you take carbon out to keep it in over the long term,” says Bryan Mignone of the Brookings Institution. “But, that is the right metric to evaluate it—that is the right time scale to be thinking about carbon sequestration.”

Mignone says that there is a broad political appetite for expansion of forestry offsets in cap and trade proposals mainly because they come with a lot of “mitigation co-benefits” like Hurteau has described for wildfire risk. “If we can deal with climate security and at the same time do other things that help in other ways, then it helps to align stakeholders—carbon traders, buyers, environmentalists, foresters—and increase support.”

John Nickerson, a forester working with the California Climate Action Registry to develop protocols for forestry offsets, believes that some of Hurteau’s ideas are already starting to permeate offset programs in the sense that most forestry offset protocols now include different measures of risk of “reversal,” or carbon loss through disturbances such as fire. These programs, including CCAR’s offset program also account for actions taken by landowners to mitigate fire risk.

He still sees obstacles to a more detailed accounting of fire risk in the protocols, primarily in terms of applying a comparable methodology across forest types and landowners, but also in answering the basic question of how much risk is acceptable.

“What is the appropriate stocking level for managing carbon and fire risk,” says Nickerson. “I am sure you are never going to get complete agreement.”

Despite his concerns, Nickerson is optimistic about the future of forestry offsets and their potential to drive good forest management.

“These programs are young and evolving and that will continue,” says Nickerson.

The Next Step

Encouraged by the response his research has received in climate policy circles, Hurteau has taken it one step further.

Along with two colleagues, Bruce Hungate and George Koch, also with Northern Arizona University, Hurteau has begun to look at ways to create precise values for the carbon in forests due to wildfire risk. They have developed a model that includes the condition of the forest and its fuels profile, as well as historical data on mean fire return intervals, or the periods between reoccurrence of fires. This provides a measure of the likelihood of a fire impacting the forest. They then used the permanence period, or the period in which carbon is supposed to remain in the forest under the offset agreement, and the market value of carbon to determine a final valuation of the carbon in the forest.

Hurteau says that it may be a while before their model is used to develop commodity prices for carbon on a carbon market exchange, but it does represent an improvement.

“This is a step forward, but it needs further refinement through more exact determinations of the amount of carbon stored and lost in a forest through different practices.”

Climate policy experts expect the issue of a cap and trade program to be taken up by the Obama administration in 2010, and meanwhile, Hurteau is hoping to provide a model that could give both forest owners and carbon offset purchasers a more clear picture of the relationship between fire and carbon sequestration in western forests.

Advances in Fire Practice is a sub-site of [wildfirelessons.net](http://www.wildfirelessons.net) and is focused on bringing efforts and ideas to the forefront that leaders in the fire management, practice, and research communities have identified as innovative and widely applicable. It provides access to critical and proven fire information and resources. Advances in Fire Practice section can be reached directly by going to <http://www.wildfirelessons.net/AFP.aspx> or through the main Wildland Fire Lessons Learned Center website at www.wildfirelessons.net.

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