

Well before the rise of plantation forestry in New Zealand and Brazil, the highly prized Douglas fir forests of Oregon and the Pacific Northwest served as the quality wood basket to the world. During the post-World War II building boom, Oregon forests helped to house the country.

While the direct economic benefits of the forest products industry have declined, forests remain an essential part of Oregon's famed "second paycheck," which comes in the form of scenic vistas and recreational opportunities. Forests also perform essential ecosystem services. They store carbon, filter water, and provide essential habitat for plants and animals.

Even the staunchest environmentalists are realizing that a healthy forest on the Oregon landscape depends on the existence of a robust forest products industry. Without thinning and harvesting, managed forests become dense, unproductive, and susceptible to fire and insects, and as the number of mills in eastern Oregon has declined, hauling costs have increased to the point where logging can become unprofitable. In California, the loss of forest industry competitiveness has led to another problem as well—an increased conversion of land from forest to development.

The dilemma is that while forests provide a wide range of environmental products, services, and amenities, forest landowners are largely able to earn money for only one product: timber. Thus, industrial forestland owners look to maximize timber revenues, and the provision of public goods, such as habitat and water quality, is ensured through regulations, including harvesting limits in areas identified as sheltering endangered species. The result is a highly political process that pits Oregonian against Oregonian and leaves no one satisfied.

A powerful way to address this predicament is through new markets to compensate landowners for specific environmental services. Just as wind turbines can provide an additional source of income for some ranchland owners, markets for ecosystem services can offer new ways to boost profitability for forestland owners, while ensuring the public benefits that forests provide.

Emerging Carbon Markets

Among the emerging environmental markets, the one that has caught the attention of policy makers and entrepreneurs from California to Zimbabwe is the carbon market. The carbon storage capacity of forests can be a significant factor in mitigating, or offsetting, the global emissions of greenhouse gases.

The Kyoto Protocol obligates participating countries to a target for annual emissions of greenhouse gases, the most important of which is carbon. Strategies for achieving those targets can include both direct reductions, achieved through reducing emissions at power plants, for example, and indirect reductions, achieved by energy efficiency investments or increasing the carbon stored in forests, for example. Kyoto has led to the establishment of markets for trading carbon emissions credits, most notably under the European Union Emission Trading Scheme (EU ETS). In 2005, the first year of operation under the EU ETS, trading activity totaled \$10 billion, and 2006 activity is estimated at \$40 billion.

Although the US is not a Kyoto signatory, progressive states are rapidly developing emission reduction targets, policies, and trading systems. California's Climate Action Registry is the most prominent, but Oregon has been an innovator, as well. Oregon was the first state to create a regulated carbon market, with the 1997 legislation that required new power plants to offset part of their emissions. On the other coast, ten Northeastern and Mid-Atlantic states have banded together to form the Regional Greenhouse Gas Initiative to collectively reduce and trade emission reductions.

In fact, the US pioneered the *cap-and-trade* approach to emissions regulation over a decade ago. In response to the 1990 Clean Air Act Amendments, which sought to reduce the effects of acid rain and persistent smog, the Environmental Protection Agency (EPA) launched a cap-and-trade system to reduce sulfur oxide (SOx) and nitrous oxide (NOx) pollution in 1994. The plan gave emitters permits to pollute and then reduced the total number of permits each year. In contrast with previous policies that mandated specific approaches to reducing pollution, the cap-and-trade system enabled emitters to select their preferred approach to reducing emissions. Emitters could comply either by directly reducing emissions or by buying permits from other facilities. The success of this system in efficiently reducing overall SOx and NOx emissions has served as a primary reference point in the recent discussion and design of carbon markets.

Forestry Offsets

Both the SOx/NOx and European Union trading schemes offer valuable lessons in the design of emissions trading markets. For forestland owners, the key questions are whether carbon markets will include provisions for the offset of emissions through forest carbon storage—or sequestration—and, if so, how those provisions will be defined. The operations of the EU ETS follow the guidelines set by the Kyoto Protocol, which recognizes two kinds of forestland management-based offsets, afforestation and reforestation. Afforestation means planting trees on lands that were not previously forested; and reforestation means replanting trees on deforested lands. Forest management, meaning to increase sequestration through changes in management practices on existing forestland, is not recognized under the first Kyoto commitment period, which runs through 2012.

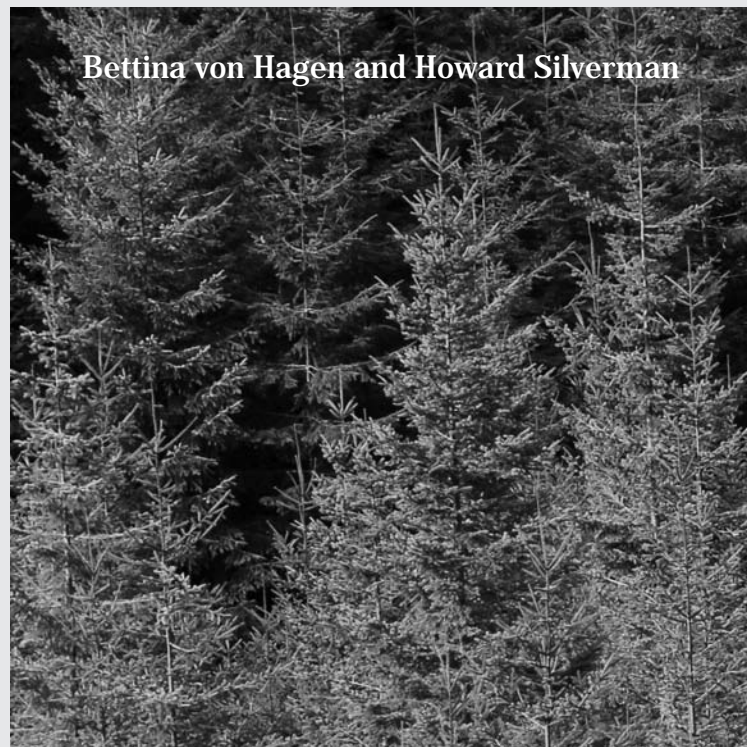
Home in the Pacific Northwest

The intricate details of carbon market operations hold important news for the Pacific Northwest. A fully operational carbon market that allows for forest management offsets could change the dynamics of the forestry industry in this region. Here's how.

The dominant practice on the region's industrial forestlands is to clearcut at 40 years and replant. The time value of money, based on interest rates and the practice of discounting future earnings, encourages early harvest, even though these forests don't reach their peak rate of growth until decades later, in some cases at over 100 years. As a result, modeling by Ecotrust and others indicates that, when managed on longer rotations, the region's forests can double their carbon storage, and possibly even produce more wood. In terms of product quality, longer rotations also mean higher quality wood—more sawlogs and less pulpwood.



forests and carbon



Bettina von Hagen and Howard Silverman

There are two broad categories of concern about the efficacy of forestry-related carbon offsets, additionality and permanence. Additionality means the assurance that emission reductions go beyond those that would occur under business as usual. Would, for example, a parcel of forestland have been replanted anyway? If so, then no mitigation of emissions has really occurred. The verification of additionality is a concern for all types of carbon offsets, including investments in energy efficiency, not just forestry.

Concerns about permanence, on the other hand, are specific to forestry offsets. Consider the construction of a wind farm as an example of an energy investment. If a tornado knocks out the wind turbines, all the emissions mitigation that occurred in the years prior to the tornado would still have been achieved. However, if a fire burns a forest, all the carbon stored in the intervening years is lost to the atmosphere. In a fully functioning carbon market, forest fires are a risk assessment that can be addressed by self-insuring through additional forest ownership, or by purchasing insurance in a forest pool created for this purpose.

Though the complexities of forestry offsets described above might sound daunting, their inclusion in an emerging carbon market offers significant potential for emissions mitigation. The EPA projects that afforestation and forest management in the U.S. could mitigate 356 million metric tonnes of carbon dioxide per year (annualized over the period 2010-2110 at a constant price of \$15/tonne), representing 6% of the nation's total emissions. The common wisdom about carbon mitigation strategies, as described by Drs. Stephen Pacala and Robert Socolow in a 2004 issue of *Science* and dramatized in the movie *An Inconvenient Truth*, is that a successful reduction of emissions will depend on several such incremental "wedges."

With the prospect of a revenue stream based on payments for carbon offsets, forestland owners would have a greater incentive to manage for longer rotations and greater biomass productivity.

It turns out that forest management based on longer rotations, along with alternative management practices such as greater retention of standing trees and downed logs, could provide other public benefits as well. Modeling by Dr. Andrew Carey, now retired from the National Forest Service's Pacific Northwest Research Station projects that this type of "restorative forestry" would offer far greater ecological services from the region's forestlands.

The incentives for restorative forestry would thus be bolstered by the emergence of other markets, as well. Markets for habitat and water quality could provide financial returns for good stewardship among many of the region's rural landowners. A September 2005 *Scientific American* article applies this concept to the family farm. In their idealized example of the farm of the future, only 30% of revenue comes from traditional commodity sources such as wheat and wool. The other 70% comes from renewable energy production, certified timber production, and carbon, biodiversity and water quality credits.

Turning back to forests, it's worth reiterating this vision for the Pacific Northwest: some of the world's highest quality wood, from some of the world's most productive forestlands, which are employing a highly skilled rural workforce, while mitigating climate change and providing a full range of public benefits. We have an opportunity to define a Pacific Northwest brand of forest products, based on the natural advantages of this region.

At Ecotrust, we have been so enticed by this vision that in 2004 we launched a private equity forestland investment fund to purchase and manage Pacific Northwest forestlands. Small but growing, Ecotrust Forests LLC now owns 12,000 acres in Oregon and Washington. But that is a story for another day. 