



Ecological Restoration Institute

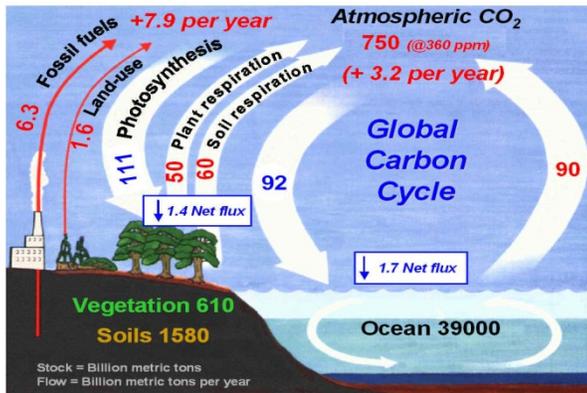


Fact Sheet: Forest Restoration and Carbon Sequestration March 2009

Introduction

Global climate change is the environmental issue of the twenty-first century. Its negative impacts are already being observed with more expected to occur during the coming decades. However, international, national, corporate, and individual efforts are underway to soften the blow of climate change and eventually decrease its influence. These actions include changes in land use; developing better, carbon-neutral technologies; and resource conservation and recycling.

One area of interest to policymakers and researchers is carbon sequestration because storing carbon in various forms other than in the atmosphere will help lower carbon emissions and, consequently, reduce greenhouse gases (GHG), such as carbon dioxide (CO₂).



Forests as Part of the Solution

Since vegetation and soils are a primary means of sequestering carbon, forested ecosystems have a role to play in this effort. Forests constitute both a sink and a source of atmospheric CO₂. Forests absorb carbon through photosynthesis and growth, but emit carbon through decomposition or when trees are destroyed due to human and natural causes. Researchers also indicate that forest products, such as furniture and building materials, sequester carbon. They also note that using woody biomass to produce energy can help replace the petroleum-based fuels that produce GHG when burned in our cars and factories.

Forests in the United States currently sequester 71,000 metric tons of carbon (Heath et al. 2003) or roughly 10,500 metric tons/acre. While the amount of carbon sequestered per acre is less than this average in the frequent-fire forests of the western United States, the amount of carbon storage capacity is still significant because of the hundreds of millions of forested acres in the Intermountain West that are

overseen by public land management agencies.

Unfortunately, the semi-arid, frequent-fire forest ecosystems of the western United States (e.g. ponderosa pine, pinyon-juniper) are beset with problems that leave them in an unhealthy state and susceptible to destruction from catastrophic wildfires and/or insects and disease. This level of disturbance is unnatural to these systems and releases considerable amounts of CO₂ to the atmosphere either through burning or losses of soil-bound carbon due to erosion following fires. In the last 15 years, unnatural disturbances to these ecosystems have been dramatic, so dramatic that they have led to the passage of legislation (e.g., The Healthy Forests Restoration Act of 2003) and the funding of research efforts to correct the situation. Forest restoration, because it seeks to return the forested ecosystem to a healthy condition with large trees, abundant grasses and protected soils, is a key management technique that can help us correct this situation.

Forest Restoration and Carbon Sequestration

The restoration of frequent-fire forest in the western United States requires the removal of small-diameter trees either through mechanical thinning, prescribed burning, or a combination of the two. These practices:

- Temporarily lower the amount of biomass in the forest and, thus, the amount of CO₂ the forest sequesters over the short term
- Reduce the amount of competition for precious water and nutrients, allowing the remaining trees to grow larger and, subsequently, sequester more CO₂ over the long term
- Produce small-diameter logs that can be used for either wood products or to produce energy
- Produce minimal levels of emissions due to logging practices and burning

While forest restoration, like all management strategies, has its advantages and disadvantages, it does two things that are vital for protecting the carbon within a forested ecosystem.

- It works with the ecology of the given forest ecosystem to produce a situation in which the carbon is stored in its most stable form within the vegetation and soil.
- It dramatically softens the effects of catastrophic disturbances (e.g., wildfires, insects, disease) and allows natural disturbances (e.g., low-intensity, ground-level fires) to play their essential role.

The Ecological Restoration Institute is dedicated to reversing declines in the condition of forested communities throughout the Intermountain West, particularly those affected by severe wildfires and insect outbreaks. Our efforts focus on science-based research of ecological and socio-economic matters related to restoration as well as support for on-the-ground treatments, outreach, and education.

Ecological Restoration Institute, P.O. Box 15017, Flagstaff, AZ 86011, 928/523-7182, FAX 928/523-0296, www.eri.nau.edu

A recent study by Finkral and Evans (2008) examined the full effects on carbon of an actual restoration thinning treatment in a ponderosa pine forest. They found that while the treatment initially produced a 30-percent reduction in the carbon held in trees, it significantly reduced the threat of an active crown fire, which they predicted would kill all the trees and release 3.7 tons of carbon per acre in any untreated areas. Such findings are especially important when one considers that global climate change will likely make the conditions for catastrophic fire and insect outbreaks even more prevalent in the western United States.

Paying for Forest Restoration with Carbon Credits

Efforts to control and abate GHG in the United States are presently configured on a market-based format. One of the key instruments in this scheme is emission trading, which is a transaction-based market where emission-reduction project credits, such as those produced by forest projects (e.g., afforestation, reforestation, restoration) are traded to offset allowed emissions produced by industry, utility companies, and others. Forest restoration efforts are recognized in these markets as “forest management projects” because they can offset GHG emissions by sequestering carbon as well as prevent the loss of carbon due to catastrophic wildfires or insect outbreaks. People and organizations undertaking such restoration efforts have the potential to receive monies for their work. This is a welcome possibility because paying for forest restoration remains one of the key roadblocks to implementing large-scale projects on federal lands.

Presently there are two voluntary markets for trading forestry offsets: the Chicago Climate Exchange (CXX), which is relatively well established, and the new Green Exchange. These markets serve as trading centers, much like the stock exchanges, for entities on both sides of the carbon mitigation equation. They also are engaged with other carbon registries (e.g., Department of Energy National Voluntary Reporting of Greenhouse Gases Program, California Climate Action Registry, Regional Greenhouse Gas Initiative), aggregators, and non-government organizations (e.g., Carbonfund, The Climate Trust, Powertree) to match carbon buyers with offset projects.

Each market has its protocols to assure that the offsets produced by the project mitigate the emissions they were traded for. As a result, there are verification procedures both prior to accepting the project and at its completion. These protocols help overcome the various problems of additionality, permanence, leakage, saturation, and equivalence that can arise in such projects. These problems produce transaction costs for the project that project operators must be aware of and figure into their balance sheets (Ruddel et al. 2006).

Because carbon is presently selling at slightly less than \$1 per metric ton on the CXX, there is little incentive now to try to obtain carbon credits for forest restoration projects—the income would not offset the costs. However, as Yale Forestry’s Deborah Spalding reports “Most participants expect this depressed price is a temporary phenomenon which will reverse itself when a federal mandatory market is put in place” (Spalding unpublished). In fact, there is much anticipation within these markets that the Congress will pass cap-and-trade legislation sometime in 2009 or 2010, and it will be signed by President Obama (Kharouf 2009). This could mean that within a few years the United States could be the largest carbon market in the world with as much as \$1 trillion traded annually (Kharouf 2009).

Being Ready for the Future

Federal agencies, such as the Forest Service, are now publicly declaring their interest in managing public lands, including forests, to reduce GHG and mitigate global climate, while maintaining the ecosystem and other services provided by these lands (US Forest Service 2008). While now may not be the time to sell carbon credits from federal lands, planning to do so could be undertaken in order to be prepared for the time when prices rise, as most experts suggest they will.

Federally managed forest restoration projects, in particular, have several advantages that make them unique in a carbon market. They:

- Provide environmental and social co-benefits that many buyers and trading markets desire
- Contribute to biodiversity conservation
- Demonstrate an ability to reduce GHG emission levels beyond what would have occurred had nothing been done (i.e., they address the problem of additionality)
- Provide a relatively high degree of permanence by reducing risk from wildfire and/or insect outbreak, and, because they are federal lands, from deforestation due to land-use changes
- Are being offered by a known, reputable entity with sizable land holdings and a staff that includes people familiar with carbon markets and forestry issues.

In general, preparing for the carbon market will likely involve new accounting tasks to ensure that the problems of carbon trading are handled properly. However, these tasks do not appear insurmountable and the benefits of increased monies for restoration treatments will make the frequent-fire forests of the western United States healthy, resistant to catastrophic disturbances, and a sink for GHG-mitigating carbon.

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