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Ecofocus: Even older forests help control CO₂

By William H. Schlesinger

Carbon sequestration is a hot topic among policy makers looking for ways to reduce the impact of global climate change. It is best defined as the act of capturing or removing carbon dioxide from the atmosphere and storing it in a form unable to influence the climate. Carbon storage in trees is a form of carbon sequestration. During photosynthesis, trees remove carbon dioxide from the atmosphere. Much of this carbon is stored in their wood, which is about 50 percent carbon by weight.

When talking about the amount of carbon stored in trees and soils, scientists often use units of teragrams. A teragram is equivalent to a million metric tons. Each year, largely as a result of burning coal, oil and natural gas, the United States emits more than 1600 teragrams of carbon into the atmosphere. This is a huge number. If you were to take 100 railroad cars and fill each one with 100 tons of coal, the entire train would hold 1/100th of a teragram of carbon.

How much carbon can trees take up? In the southeastern U.S., where young pine plantations cover large tracts of land, annual carbon accumulation is about 2.0 tons per acre. To accumulate only 10 percent of the nation's carbon dioxide emissions in wood, we would need to plant a young forest roughly the size of Texas.

Why do we focus on young, planted forests? Because growing trees take up more carbon than older trees. Eventually, all forests mature to what is known as a steady-state. Even then, some trees in the forest are growing, but others are dying, and the total biomass per acre does not show an increase in carbon content. Only in young forests can we expect significant carbon sequestration.

It is tempting to suggest we should replace mature forests that no longer sequester carbon with young forests that do. This would be a mistake. When old forests are harvested, carbon stored in their soils and biomass is released back into the atmosphere as CO₂. When we look at the difference between the carbon captured by a newly planted forest and the carbon released by cutting a mature forest, the gain is often negligible.

Old growth forests retain much larger stores of carbon than long-lived timber products, such as houses and furniture that are made from them. We should make every effort to retain old forests, both here and in the tropics.

If we want to maximize how carbon is stored in trees, we need to plant forests in previously harvested areas (reforestation) and encourage forests to grow in areas that

have never supported trees (afforestation). These new forests would accumulate atmospheric carbon dioxide for decades. Upon reaching maturity, we could determine if it was best to maintain them or harvest them as a renewable fuel resource.

Today, U.S. forests are accumulating approximately 500 teragrams of carbon a year, or about 1/3 of the nation's carbon dioxide emissions. Without forests, atmospheric CO₂ levels would be rising even faster than they are. Can we increase the rate of carbon sequestration so forests can accumulate even more carbon? That is a question of ongoing scientific research critical to this nation's future.

Forests are one of the environments being investigated for their carbon storage potential. The next installment of Ecofocus will look at another carbon sink - the ocean.

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