Point Blue Publication Brief

Streamside forests store tons of carbon

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Forest restoration is a strategy for addressing climate change because forests store tons of carbon, both in the trees and the soil. However, the carbon storage potential of streamside forests is relatively unknown, despite extensive efforts to restore these forests globally. We compiled data on carbon storage from 117 publications, reports, and other data sets on streamside forests around the world to determine how they compare to other forest types and estimate how much carbon storage can be expected from restoring them.

We found that the average amount of carbon stored in mature streamside forest rivals the highest estimates for any other forest type around the world. The estimates for streamside forest vary depending on whether it is located in a relatively wet or dry, and warm or cool climate, but the average values range 168 – 390 tons of carbon per acre in the trees alone. We also found that, on average, soil carbon can be expected to more than triple when converting from an unforested site to a mature streamside forest. However, as with other forest types, it can take decades for these changes to go into full effect, on the order of 40-90 years for the carbon stored in trees (depending on climate) and more than 115 years for soil carbon. We also found that planting trees to actively restore these forests gave them a head-start: over the first 10 years, they stored carbon in the trees at more than twice the rate of forests that were regenerating naturally.

Our results reflect patterns for streamside forests around the world, but we could not find suitable data from every continent, or for actively planted streamside forests more than 50 years old. There are also other potentially important factors that we could not examine, such as the frequency of flooding. We encourage additional data collection that will allow us to further refine these estimates and better document the long-term carbon storage benefits.

Streamside ecosystems around the world have been severely degraded, and their large-scale restoration is a priority in many places, including California's Central Valley and Brazil. Restoring these ecosystems is known to benefit water quality, habitat for fish and wildlife, and recreational opportunities like fishing and wildlife watching that help support local economies. Our results demonstrate the substantial additional benefit of carbon storage, which should increase the priority of restoring and maintaining streamside forests.

Main Points

Mature streamside forests store as much carbon as any other forest type in the world, helping to address climate change.

Planting trees to actively restore streamside forests can more than double the rate of carbon storage.

Carbon storage is an important and previously overlooked co-benefit of streamside forest restoration.

Dybala KE, Matzek V, Gardali T, Seavy NE. (2018) Carbon sequestration in riparian forests: a global synthesis and meta-analysis. Global Change Biology. 10.1111/gcb.14475.

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