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January 2023: Forest Carbon Research

US Forests, Trees, and Wood Products Store Carbon, Curb Greenhouse Gas Emissions — But May Wane in Capacity

Forests and harvested wood products, such as the lumber used in houses, store carbon dioxide. Carbon emissions, which contribute to changes in climate, are diminished when absorbed and stored by forests and wood products. Our most recent resource update, [Greenhouse Gas Emissions and Removals from Forest Land, Woodlands, and Urban Trees in the United States, 1990-2019](#), not only shows how forests and harvested wood products continue to store greenhouse gas emissions but also signals an **anticipated, gradual reduction in the US forest carbon sink over the next few decades**. Other Forest Service reports, such as the [Resources Planning Act Assessment](#) and previous annual reports, also anticipate this reduction.

Reductions in carbon storage may be fueled by wildfire, drought, insect infestations, disease-related tree mortality, and land-use change. Despite this projected wane in carbon storage, US forested lands, wood products, and urban trees continue to represent the nation's largest net carbon sink — **offsetting more than 12 percent of US greenhouse gas emissions in 2020**.

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USDA Forest Service Photo by B. Borden

US Homes Store Carbon for Decades

The wood used to build homes sequesters carbon over the long term. Since over 90 percent of new single-family homes are built mainly with wood, their carbon storage capacity adds up. New research from Forest Service scientists and partners indicates that the **wood used to build and maintain houses will continue to account for nearly half to over three quarters of the carbon stored in wood products annually**. The outcome hinges on trends in construction, such as the number of new houses built, the sizes of houses built, and the number of houses needing repair.

Forest Carbon Estimates in Your Back Pocket

Forest Service Research & Development has long provided forest landowners with resources to better understand forest carbon stocks. In 2006, GTR-NE-343 offered “carbon lookup tables” drawing from Forest Inventory and Analysis data to provide estimates of forest carbon attributes based on region, forest type, and stand age. GTR-NRS-202, “Standard Estimates of Forest Ecosystem Carbon for Forest Types in the United States” updated those values to provide **ecosystem carbon yield tables for 53 forest types within 11 regions of the United States**. While regional estimates are not as accurate as site specific data, they provide a reasonable estimate of expected carbon stocks when site-specific data are not available.

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Wood Observations Spur Updates to Tree Carbon Estimates

Most protocols for estimating and reporting carbon stocks **approximate that 50 percent of woody biomass in trees is carbon**. However, Forest Service researchers and partners compiled nearly 3,600 wood observations and **finessed this number to a mean of 47.4 percent** for US trees. Considering that 1.4 trillion trees live in the US alone, this small percentage difference could significantly affect global carbon estimates.

Report Identifies Best Carbon Storage Techniques

In 2019, Forest Service scientists and partners launched the Carbon Research Initiative to identify which forest stewardship practices and resource uses best store greenhouse gases. The 2022 Carbon Research Initiative Business Report updates their progress and highlights **eight projects in the Western US uniting scientists and land stewards**.

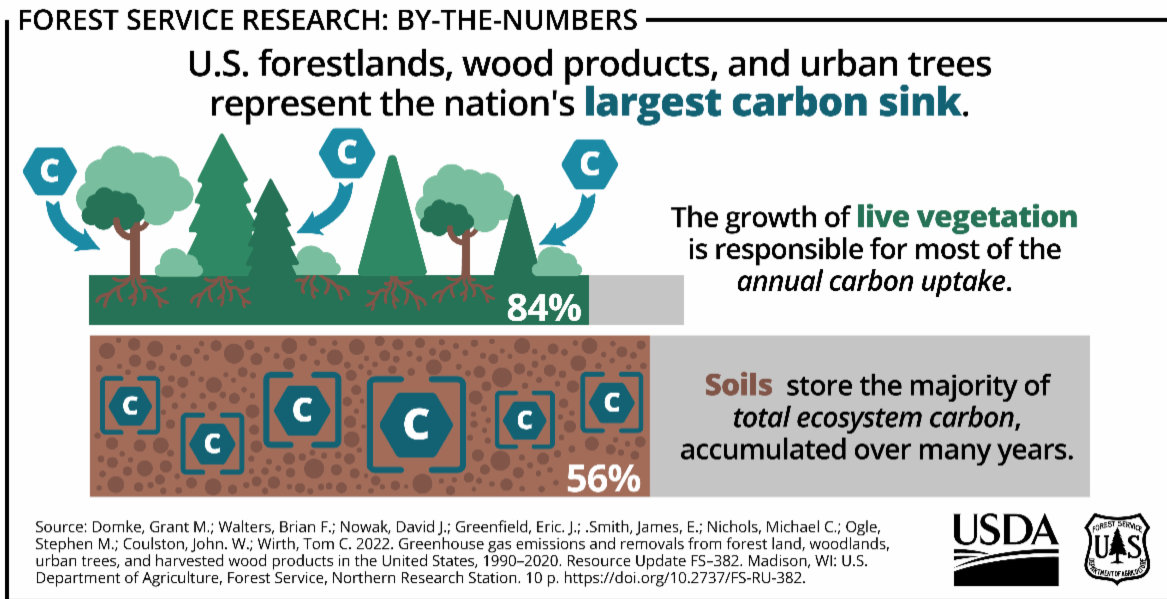
Fact Sheet: Forest Carbon Estimation and Monitoring

Forest Service scientists in the Forest Inventory and Analysis Program collect data on the ground — and in the air — to estimate the carbon stored in soils, trees, and landscapes and how this amount changes over time. In our Fact Sheet on carbon estimation and monitoring, read how Forest Service carbon data contribute to national and global reports and how we continue to improve our data and research.



USDA Forest Service photo by Brett Wilson

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