

Vermont Forest Carbon Assessment

Vermont recently received updated information on forest carbon storage and annual uptake from the U.S. Forest Service, Forest Inventory and Assessment, based on completion of the national forest carbon inventory. There were significant changes in methods and results that are clarified in a separate Forest Service document and summarized below¹.

“As a signatory to the United Nations Framework Convention on Climate Change, the United States annually prepares an inventory of carbon that has been emitted and sequestered among sectors (e.g., energy, agriculture, and forests). For many years, the United States developed an inventory of forest carbon by comparing contemporary forest inventories to inventories that were collected using different techniques and definitions from more than 20 years ago. Recognizing the need to improve the U.S. forest carbon inventory budget, the United States is adopting the Forest Carbon Accounting Framework, a new approach that removes this older inventory information from the accounting procedures and enables the delineation of forest carbon accumulation by forest growth, land use change, and natural disturbances such as fire.

By using the new accounting approach with consistent inventory information, it was found that net land use change is a substantial contributor to the United States forest carbon sink, with the entire forest sink offsetting approximately 15 percent of annual U.S. carbon dioxide emissions from the burning of fossil fuels. The new framework adheres to accounting guidelines set forth by the Intergovernmental Panel on Climate Change while charting a path forward for the incorporation of emerging research, data, and the needs of stakeholders (e.g., reporting at small scales and boreal forest carbon).”¹

The 2015 Vermont data show that forests store approximately 480 million metric tons of carbon; that they sequestered an additional 4.39 million metric tons of carbon dioxide in 2015; and that on average, each acre of forest land stores 107 metric tons of carbon (Table 1). Forest storage steadily increased from 1990 to 2015 (Figure 1), although the annual uptake rate has declined from -4.70 MMTCO₂e per year to -4.39 MMTCO₂e (Figure 2). (Note: negative values are used to mean negative emissions, or rather, uptake.) The average carbon storage per hectare of forestland increased to current level of 264 metric tons carbon/hectare (107 metric tons carbon/acre) (Figure 3).

These estimates are significantly different than past estimates. For example, the Vermont Governor’s Climate Change Commission report of 2007 estimated net sequestration of forest land at -8.23 MMTCO₂e using data through 1997, nearly double the current estimate.²

¹ Woodall, Christopher W.; Coulston, John W.; Domke, Grant M.; Walters, Brian F.; Wear, David N.; Smith, James E.; Andersen, Hans-Erik; Clough, Brian J.; Cohen, Warren B.; Griffith, Douglas M.; Hagen, Stephen C.; Hanou, Ian S.; Nichols, Michael C.; Perry, Charles H.; Russell, Matthew B.; Westfall, James A.; Wilson, Barry T. 2015. **The U.S. forest carbon accounting framework: stocks and stock change, 1990-2016.** Gen. Tech. Rep. NRS-154. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 49 p.

²Vermont Greenhouse Gas Inventory and Reference Case Projections, 1990-2030, Center for Climate Strategies, Sept. 2007.

Table 1. Comparison of Vermont’s forest carbon storage and annual uptake (net sequestration) pools in 1990 vs 2015. Units are: MMTC=million metric tons of carbon; MMTCO_{2e}=million metric tons of carbon dioxide equivalents; MtC/ha=metric tons of carbon per hectare; and MtC/acre=metric tons of carbon per acre. Negative values are used with MMTCO_{2e} to mean negative emissions, or rather, uptake of CO₂.

Forest carbon pool	Forest carbon storage (MMTC)		Net sequestration (MMTCO _{2e})		Forest carbon per hectare (MtC/ha)		Forest carbon per acre (MtC/acre)	
	1990	2015	1990	2015	1990	2015	1990	2015
Aboveground Biomass	110.1	131.8	-3.29	-3.05	62.22	72.53	25.19	29.36
Belowground Biomass	22.1	26.4	-0.64	-0.60	12.50	14.51	5.06	5.88
Dead Wood	11.7	14.8	-0.44	-0.37	6.63	8.17	2.69	3.31
Litter	29.2	29.5	-0.05	-0.05	16.51	16.25	6.69	6.58
Soil Organic Carbon	275.7	277.9	-0.28	-0.31	155.85	152.95	63.09	61.92
Total	448.9	480.5	-4.70	-4.39	253.72	264.41	102.72	107.05

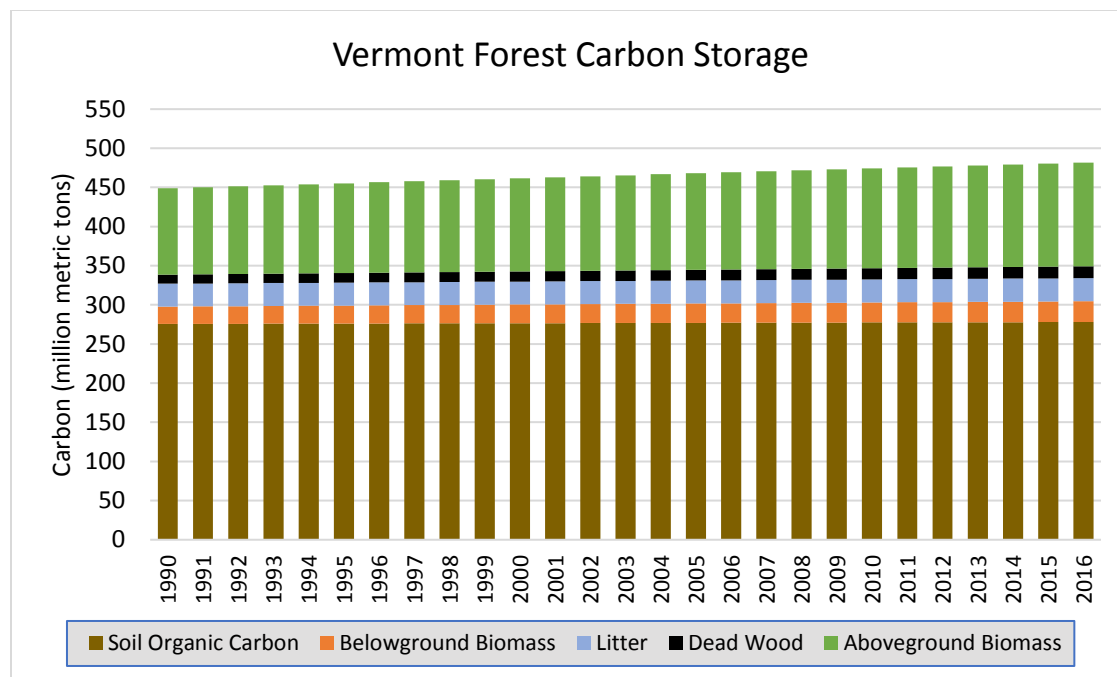


Figure 1. Trend in carbon stored in Vermont forests. The largest pool of stored carbon is in soils, followed by above ground (tree) biomass.

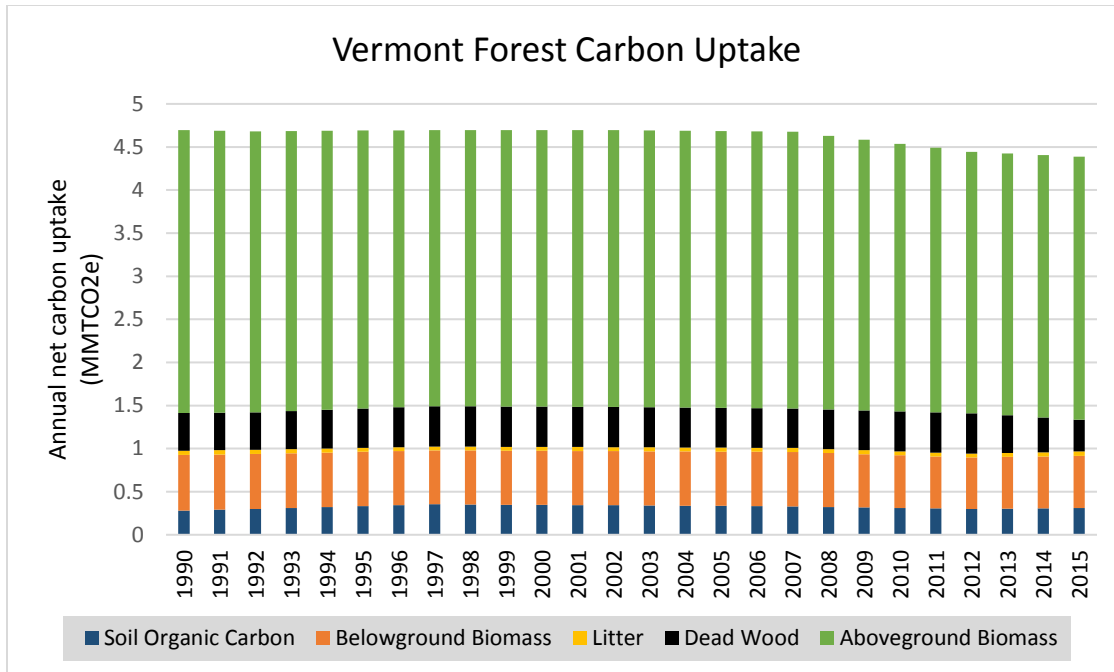


Figure 2. Trends in annual uptake of carbon. The total annual uptake was less in 2015 than in previous decades, in part due to decreasing acres of forest land.

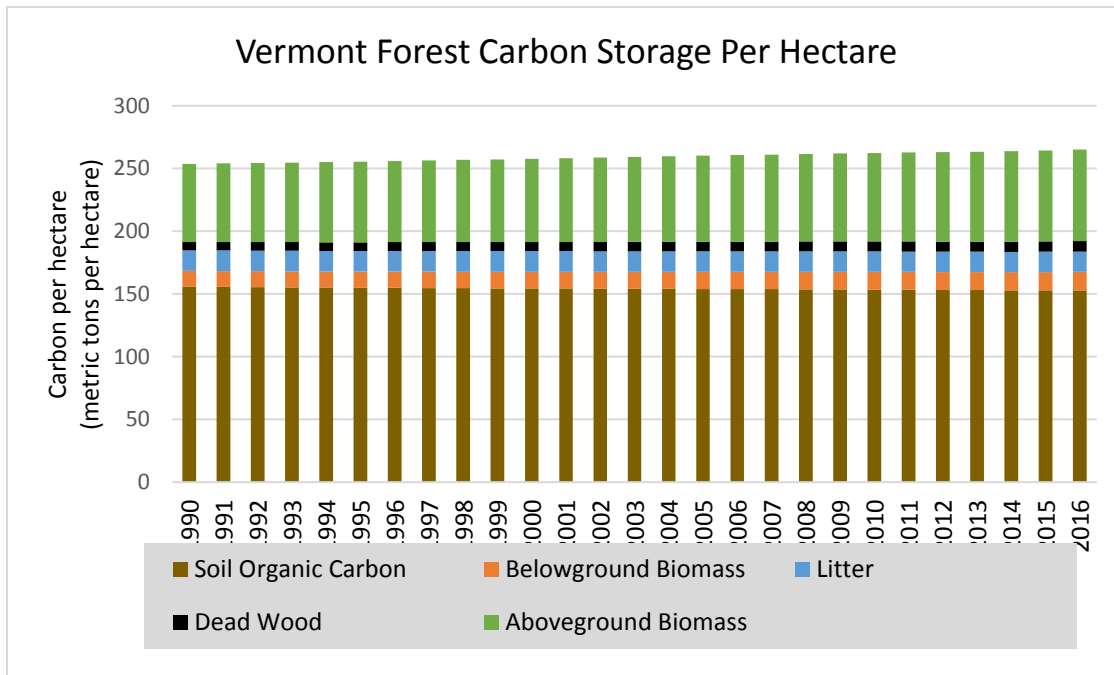


Figure 3. Trends in the per hectare estimates of forest carbon in each of the carbon pools (e.g. soils, litter, aboveground).

Citation:

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