

# Project *brief*

Thünen Institute of Forestry

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## Forest Stands as Carbon Sinks: Tabulated Data on Storage and Annual Sequestration

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- Practical tool for estimating CO<sub>2</sub> storage and annual uptake based on forest yield tables.
- Calculations follow international guidelines and also account for early growth stages.

### Background and objectives

Forests absorb carbon from the atmosphere as they grow and store it over the long term. In this way, they play an important role in climate protection. In both forestry practice and policy-making, however, it is often difficult to reliably estimate the corresponding amounts. Our practical tools make these assessments fast, simple, and reliable.

### Approach

To provide a rough orientation, we processed various yield table datasets using segmented allometric biomass functions, so that the carbon stored in forest stands and its annual changes can be read directly in tons of CO<sub>2</sub> per hectare. Early growth stages are also included. Wherever possible, the calculations follow international guidelines, which are also mandatory for Germany's National Greenhouse Gas Inventory reports.

### Results

Our "Carbon Yield Tables" complement both the traditional yield tables (Schober 1987) and the new yield tables from the Northwest German Forest Research Institute (Albert et al. 2024). They cover the tree species spruce, beech, pine, oak, and Douglas fir, and are tabulated by yield class and stand age (starting at age 1). Figure 1 illustrates the development of carbon stocks using pine as an example.

As a result of the project, an [interactive dashboard](https://easyco2.estimation.shinyapps.io/shiny) (<https://easyco2.estimation.shinyapps.io/shiny>) is also available, allowing users to directly estimate the CO<sub>2</sub> stocks of individual trees and forest stands. For single trees, users only need to enter species, diameter, and height; for forest stands, the number of stems is additionally required as an input. Figure 2 shows a screenshot of the dashboard.

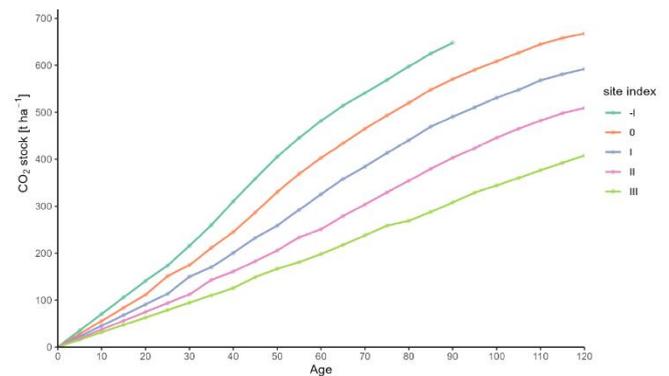


Figure 1: Development of CO<sub>2</sub> stocks, example: pine trees (Source: BRINKORD et al. 2025).

### Conclusions

Our "Carbon Yield Tables" and the accompanying dashboard provide a transparent and easily accessible way to estimate CO<sub>2</sub> storage and annual uptake in commercial forests. The results are also more accurate than calculations based on biomass expansion factors, which can lead to substantial overestimations, especially in older stands.

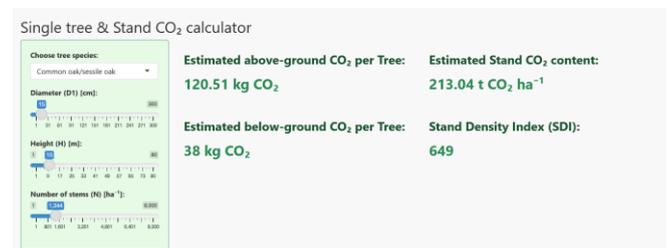


Figure 2: Screenshot of the dashboard for calculating CO<sub>2</sub> stocks in forest stands and individual trees (Source: BRINKORD et al. 2025).

### Further information

#### Contact

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<https://www.ressortforschtklima.de/en/participating-projects/anakhon>

#### Run time

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10.3220/253-2026-47

#### Project ID

2545

#### Publications

BRINKORD et al. (2025): CO<sub>2</sub> Estimation of Tree Biomass in Forest Stands: A Simple and IPCC-Compliant Approach. DOI: [10.3390/f16101580](https://doi.org/10.3390/f16101580)

BRINKORD et al. (2024): Hilfstabellen zur Abschätzung der Kohlenstoffspeicherung in Waldbeständen. DOI: [10.3220/WP1715581744000](https://doi.org/10.3220/WP1715581744000)

BRINKORD et al. (2024): Kohlenstoff-Ertragstabellen:

Tabellenblätter. DOI: [10.3220/DATA20240515142455-0](https://doi.org/10.3220/DATA20240515142455-0)

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