

Where does the CO₂ absorbed by trees end up?

Gastronomicus:

Some of it, yes. Photosynthesis converts energy from the sun and CO₂ into glucose molecules (and oxygen). Some of this is stored as sugars and starch (simple polymers of sugars). Much of it goes into production of structural compounds like cellulose and lignin which make up much of the wood and leaves.

However, approximately 65% of CO₂ taken up by trees is returned to the atmosphere. Trees consume energy stores for growth and maintenance, a process called respiration. This is similar to respiration in our own bodies, and also requires uptake of oxygen. So during an average year, a tree only retains 35% of the carbon it initially collected, released through diffusion by roots and other tissues.

When a forest burns, wood consumed by fire is reconverted to CO₂. Yet much of the woody material remains unburnt, depending on the location, fire intensity, and tree species. This unburnt wood will begin to decay in time, a process that might take years to decades. Also, roots often remain unburnt as well and decay in soil. Much of this decaying wood is released over this time as CO₂, but some of it becomes incorporated as part of the soil, where it tends to decay even slower.

Overall, the movement of CO₂ in and out of forests is much more complicated than it appears on the the surface, and while we've learned a lot, models still have a lot of uncertainty and variability in some areas. This is a highly active area of research, especially in the tropics and far north where deforestation and climate change are rapidly shifting forest dynamics.