

TREE RESPIRATION

returns CO₂ to the atmosphere, similar to how humans exhale.

While trees mainly produce oxygen, CO₂ can still be released by the leaves.

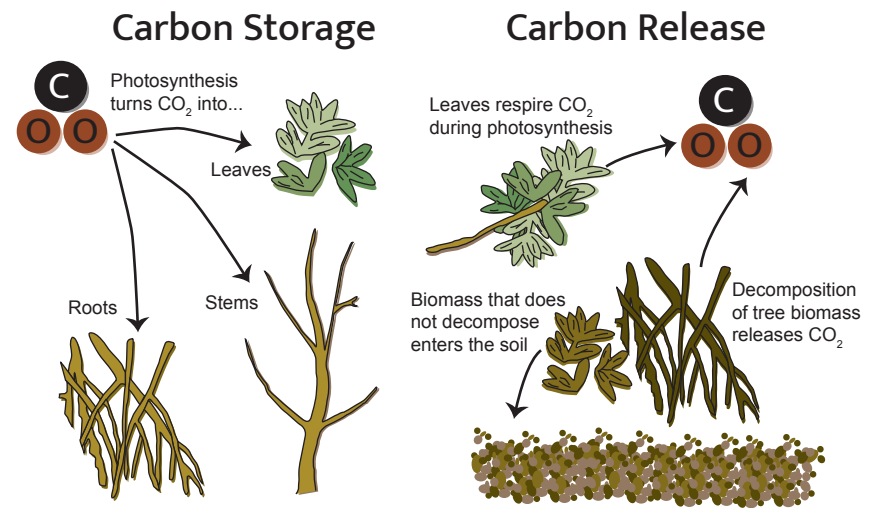
LEAVES store carbon for a short period of time, as the tree recycles them more frequently than other structures such as wood. Leaves have higher proportions of labile carbon, such as cellulose, which can decompose quickly.

Tracing the path of MANGROVE CARBON

Mangrove forests store vast amounts of carbon and are therefore emerging as a valuable resource for fighting climate change. How are these trees storing their carbon, and where does carbon travel within the forest?

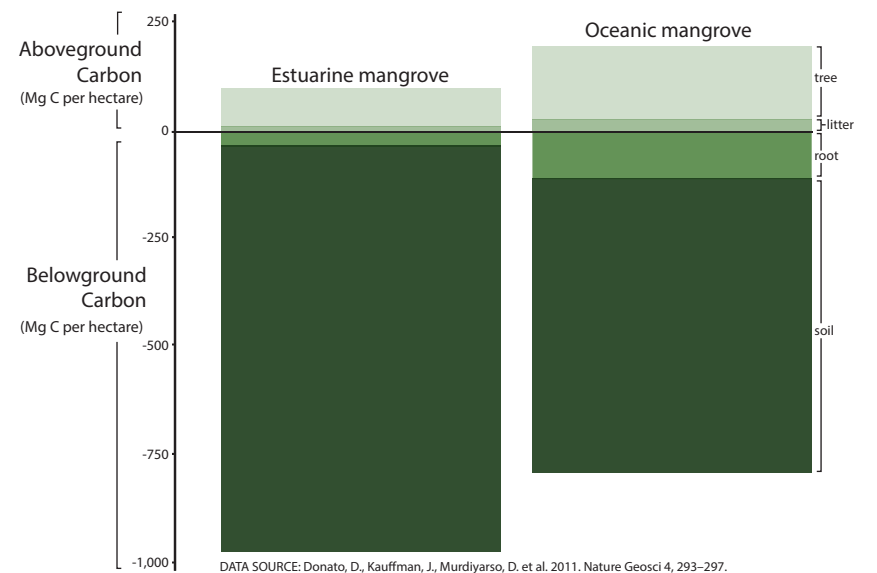
FLUXES AND FLOWS: MANGROVE CARBON MOVEMENT

Trees in mangrove forests take up carbon from the air in the form of carbon dioxide (CO₂) and transform it into biomass (leaves, roots, stems) via the process of photosynthesis. When carbon becomes a part of the tree, forests act as 'carbon sinks', as they remove CO₂ from the air and store it in a solid form. However, as trees grow and die, they release carbon back to the atmosphere via respiration and decomposition. When trees photosynthesize, they respire CO₂ similar to us humans. When trees die, other organisms break down their leaves, roots, and stems, thus releasing carbon back to the soils and atmosphere. Therefore, trees are forever cycling carbon between aboveground and belowground stores.



CARBON STORAGE IN MANGROVE TREE STRUCTURES

The belowground carbon storage capacity of mangroves is what makes them stand out. While aboveground structures are what you see on the landscape, mangrove soils are where the long-term carbon storage action is. Depending on whether the mangrove is on the ocean's edge or on river banks, the soil in which they grow can represent between 49% and 98% of their total ability to store carbon.



WOOD stores carbon in tree branches and stems and for long periods of time. Carbon is stored in wood in multiple forms such as cellulose, hemicellulose, and lignin compounds. Wood also gives the tree structural support to withstand wave action and persist through extreme weather.

LEAF LITTER falls from the tree as leaves die off and accumulate on the forest floor where the decomposition process will recycle these nutrients. Woody litter from dead branches and stems will also accumulate on the forest floor, and these materials release CO₂ as they decompose.

ROOTS store carbon underground in woody structures. Even though you cannot see them all of the time, roots are constantly growing and recycling their biomass in order to search out nutrients in the surrounding soils.

SOILS are essential for long term storage of carbon in mangrove ecosystems. Carbon from dead roots as well as decomposing litter and wood is essentially 'locked in' to the soils, especially due to the oxygen-limited conditions created by flooding and high tides.

MANGROVE SOILS: AN UNPRECEDENTED CARBON STORAGE RESOURCE

Mangroves store a disproportionate amount of carbon belowground in comparison to other forest types. Mangroves are found in highly flooded environments, usually along the edges of rivers and oceans, which create low oxygen conditions. The flooded, low oxygen conditions limits decomposition and 'locks in' organic materials as they break down very slowly or not at all. The mangrove secret to carbon storage therefore lies belowground, as their soils prolong decomposition and prevent organic matter from breaking down and releasing CO₂ back to the atmosphere.

