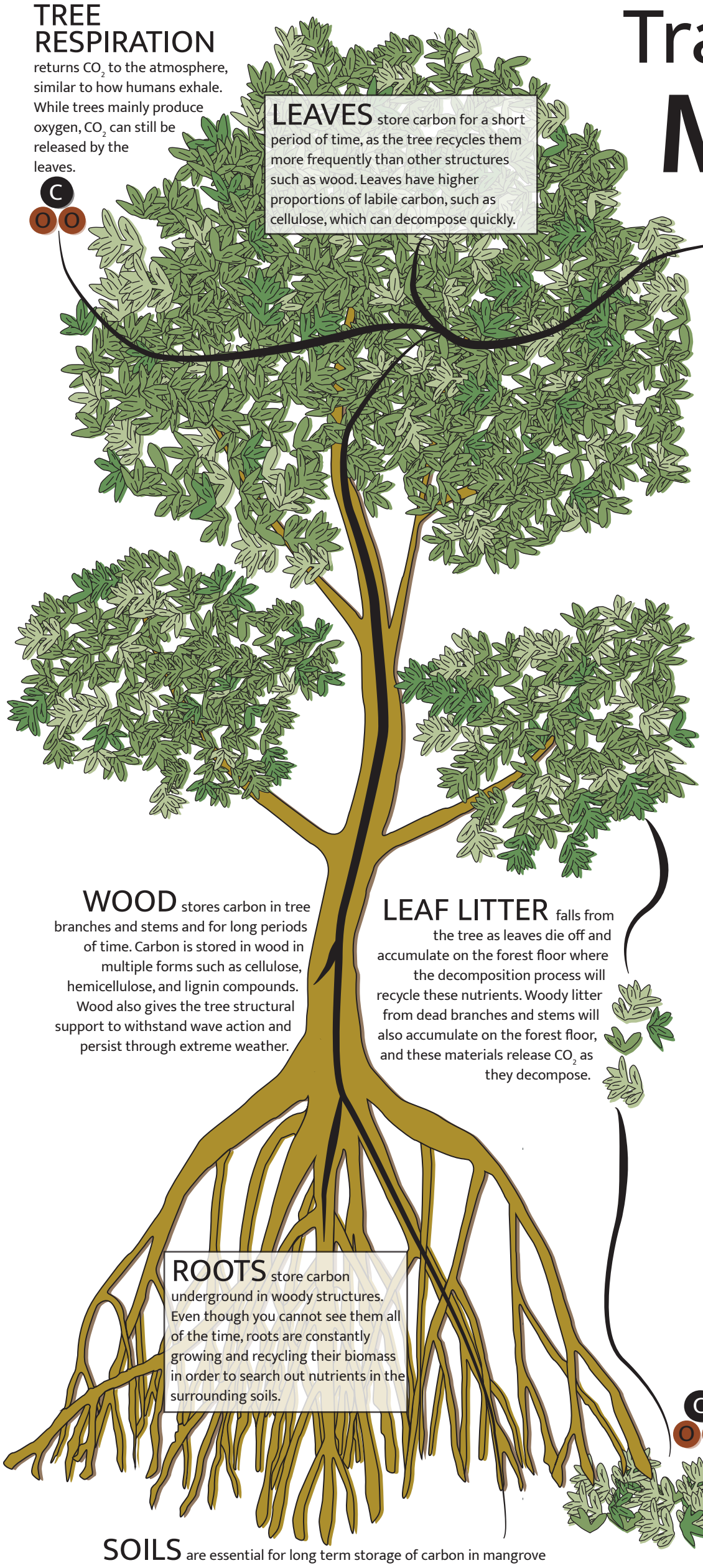
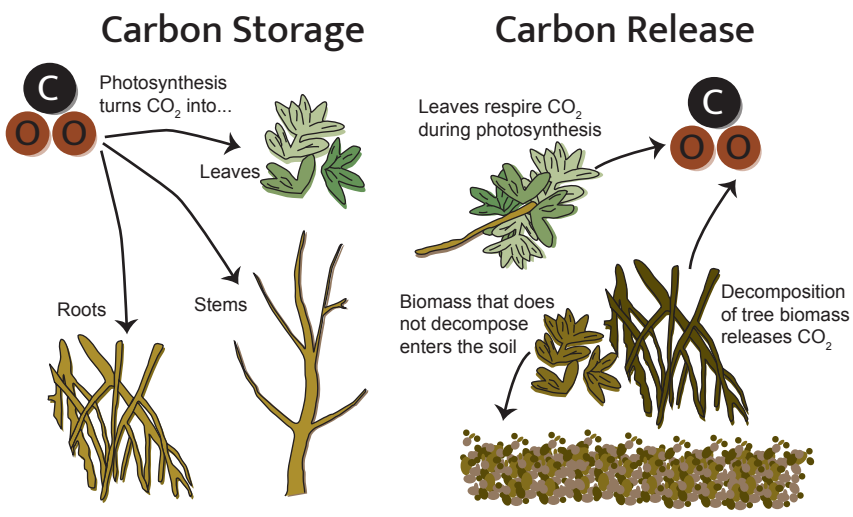
Tracing the path of MANGROVE CARBON

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

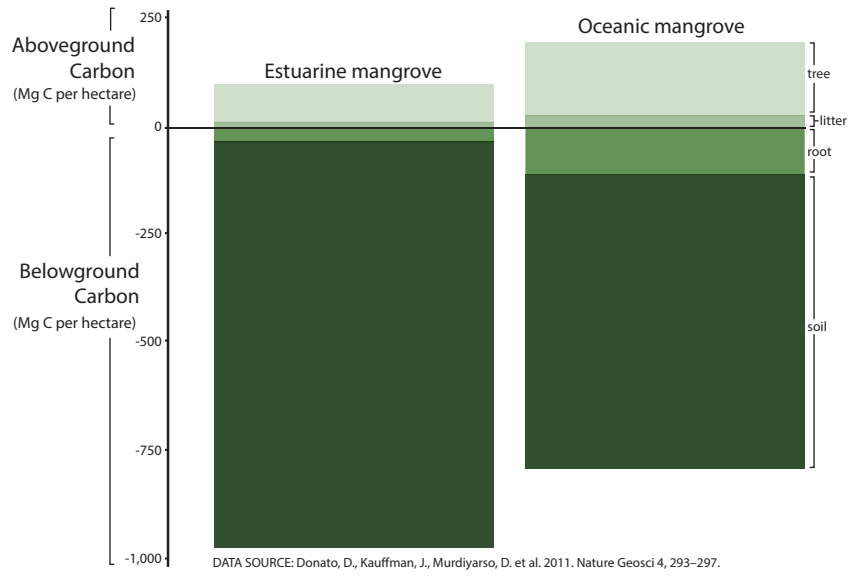
Trees in mangrove forests take up carbon from the air in the form of carbon dioxide (CO_2) and transform it into biomass (leaves, roots, stems) via the process of photosynthesis. When carbon becomes a part of the tree, forests act as 'carbon sinks', as they remove CO_2 from the air and store it in a solid form. However, as trees grow and die, they release carbon back to the atmosphere via respiration and decomposition. When trees photosynthesize, they respire CO_2 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

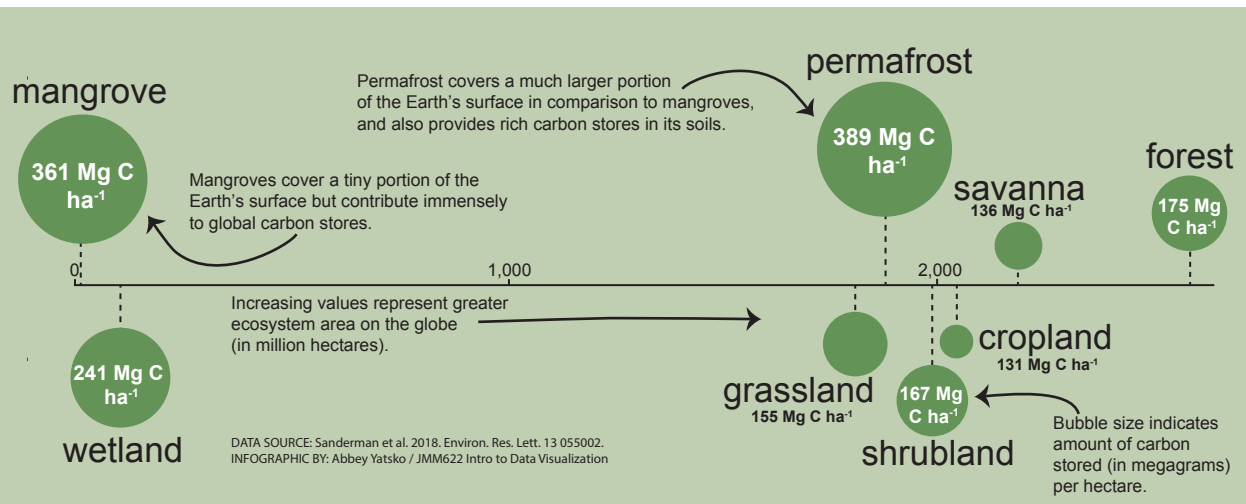
The belowground carbon storage capacity of mangroves is what makes them stand out. While aboveground structures are what you see on the landscape, mangrove soils are where the long-term carbon storage action is. Depending on whether the mangrove is on the ocean's edge or on river banks, the soil in which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



DATA SOURCE: Donato, D., Kauffman, J., Murdiyarso, D. et al. 2011. Nature Geosci 4, 293–297.

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 CO_2 back to the atmosphere.



DATA SOURCE: Sanderman et al. 2018. Environ. Res. Lett. 13 055002.
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