Forests

Forests, like agricultural practices, can be net emitters or net sequesterers of atmospheric greenhouse gases, depending upon management practices.

Forests hold the potential to sequester significant amounts of atmospheric carbon. Management practices are crucial in reducing net emissions during and after timber harvest. Therefore, it is essential that scientists and land owners learn more about the complex factors that optimize net sequestration in forests, including timber production and harvest time cycles, forest floor undergrowth, soil health, applications of pesticides that diminish forest ecosystem biodiversity, as well as the decomposition of nonliving downed wood, prior to obtaining offset credits in a forest carbon market.

Right now, healthy forests are sequestering carbon into trees and this process increases as long as the trees remain healthy, and they are not harvested/cut down. During the harvesting event and beyond, materials taken from the forests can become carbon emitters, largely through processing into lumber and lumber byproducts. The energy consumption is massive in removing trees from forests, shipping and processing, decomposition of woody residues left behind in the forest, use of timber products in long term structures (e.g., homes) In comparison, the energy consumption is much less in rapidly decomposing wood chips used in landscapes, and through microbial disturbances that stimulate decomposition in forest dead tree components and in the disturbed soil.

Historically, forests were sequestering more carbon than today. In recent decades, the situation has reversed. In Canada forests have become carbon sources, releasing more carbon into the atmosphere than they are accumulating in any given year.

Some processes can create more emissions (such as shorter harvesting intervals, fires, insect infestations that kill trees and land-use change). These processes tend to increase as the earth warms, e.g., larger and more intense fires, warmer wetter climates that enhance decomposition rates and release more carbon dioxide. These and additional interacting complex processes require sophisticated mathematical models to study and evaluate to make forest management a consistent net sink and not net source of carbon emissions.
A carbon balance through the use of carbon sequestration and storage.

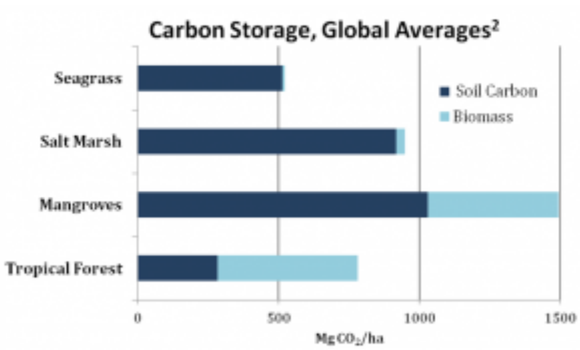
The Oregon Legislature adopted Oregon Revised Statute (ORS) 468A 250(i) in 2007 requiring the Oregon Global Warming Commission (renamed the Oregon Climate Action Commission in 2023) to "*track and evaluate the carbon sequestration potential of Oregon's forests, alternative methods of forest management that can increase carbon sequestration and reduce the loss of carbon sequestration to wildfire, changes in the mortality and distribution of tree* *and other plant species and the extent to which carbon is stored in tree-based building materials."*

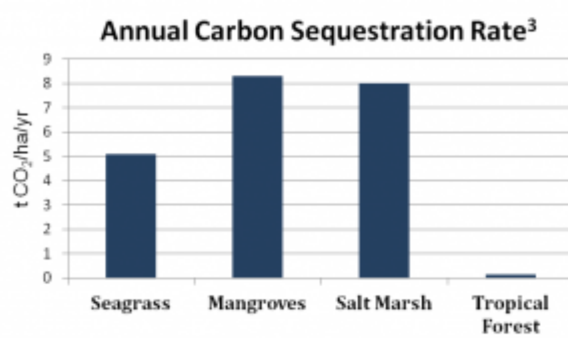
The commission established a Forest Carbon Task Force in 2017 recognizing the value of preliminary data and analysis provided by the USFS Forest Inventory Analysis Program for forest carbon accounting in Oregon. In 2018 Session the Legislature established the Office of Carbon Policy and included funding to further develop an assessment of the amount of carbon in Oregon's forests. The 2018 Forest Carbon Project Report details current projections.

Blue Carbon

"**Blue carbon**" is carbon sequestration by the world's oceanic and coastal ecosystems, mostly by algae, seagrasses, macroalgae, mangroves, salt marshes and other plants in coastal wetlands. This occurs through plant growth and the accumulation and subsequent burial of organic matter in the soil. Because oceans cover 70% of the planet, ocean ecosystem restoration has the greatest blue carbon development potential for removing (sequestering) carbon from the atmosphere. Research is ongoing, but in some cases, it has been found that these types of ecosystems remove far more carbon than terrestrial forests and store it for millennia."

Unlike forests, the largest store of carbon in wetland habitats is in the soil not above ground. In the first meter of soil, coastal ecosystems contain about 2,400 Mg (metric tons) CO2 eq per ha compared to about 250 Mg per ha in tropical forests. *The annual carbon sequestration rate in coastal ecosystems is about 100-times greater than in tropical forests.* Once sequestered into marine soils, carbon persists for centuries in the soil because when kept wet, the oxygen concentration remains low, hence decomposition of SOM is slow. Sadly, when coastal ecosystems become disturbed or drained, oxygen penetrates the soil and massive amounts of carbon dioxide are soon returned into the atmosphere.





Although coastal ecosystems cover less than 2% of total ocean area, mangroves, seagrasses, and salt marshes account for half of the carbon stored in oceans due to their ability to draw down carbon and store it for extended periods of time. The nonprofit Verra just released the first blue carbon conservation methodology approved under any major GHG program. The **methodology** adds blue carbon conservation and restoration activities as an eligible project type and is expected to unlock new sources of finance for tidal wetland conservation and restoration activities.

Verra is a nonprofit that provides the registration that keeps track of verified carbon trades.

Registries are essential to creating a credible carbon offset commodity. Registries record ownership of carbon credits and trades are **taking off** everywhere in the world. “Carbon markets for blue carbon are taking off and growing exponentially” although rules for claiming carbon credits are new and Verra is at the forefront of developing approved methods to keep track of carbon sequestration and trades as blue carbon.

The rules for claiming carbon credits from restored blue carbon habitats are new. There are a few experimental programs that are developing proof of concept. For example, a collaborative project — with planting done by the Virginia Institute of Marine Science (VIMS) and the Nature Conservancy, and long-term carbon data provided by the University of Virginia — is the first seagrass project in the world to apply for carbon credit certification with the Washington-based nonprofit Verra, the world’s largest overseer of **carbon credit projects**.

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