

# The Natural Boom & Bust Cycle of Forest Carbon

Carbon **uptake** & **storage** (growth)

Carbon **uptake** & **storage** (re-growth)

**CARBON**

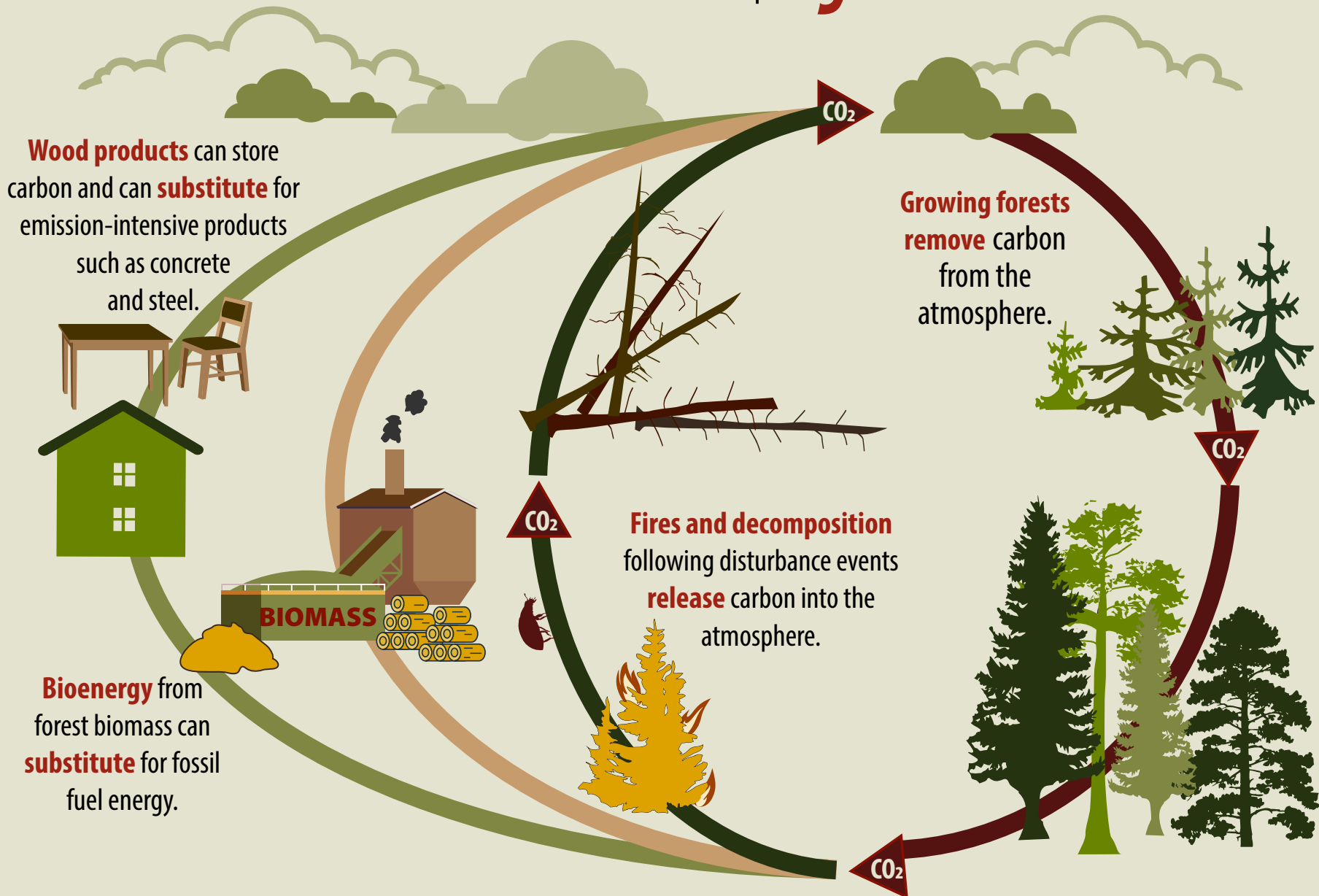
Carbon **release** (fire)

Carbon **release** (decomposition) & **storage** in dead trees

Below-ground carbon **storage** (in roots & soil) is about 50% of forest carbon

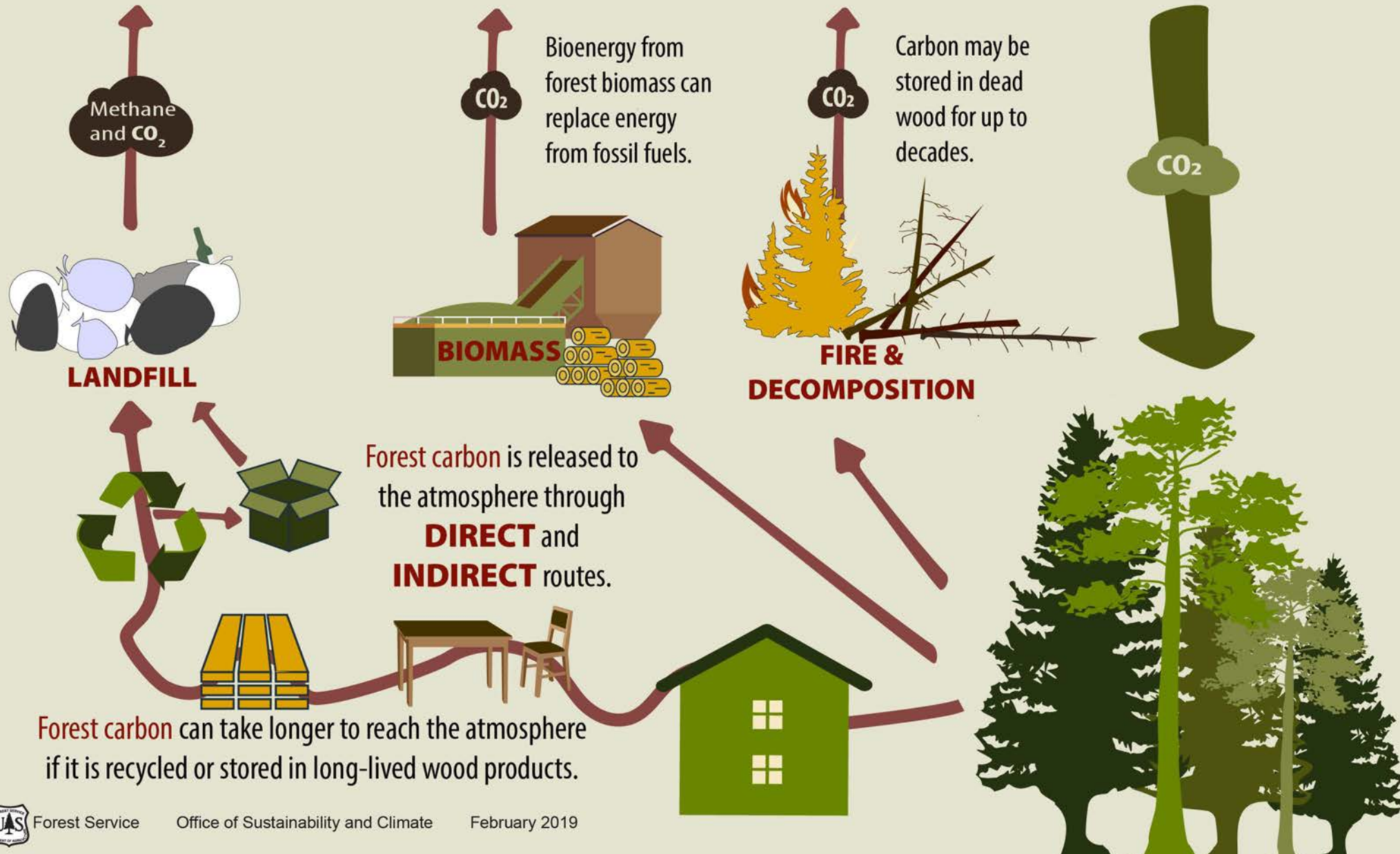
# Management and Disturbance in FOREST-ATMOSPHERE INTERACTIONS

# Carbon Cycle



# Various pathways of FOREST CARBON into the ATMOSPHERE

# Carbon Flux



# The Change from a Wood-based to a Fossil Fuel-based Economy

# Carbon Stocks

The United States **lost 60%** of its pre-European forest carbon stocks during settlement and into the industrial revolution.

About **40%** of the carbon lost during the industrial revolution has been **recovered** via re-growth.

**CARBON**

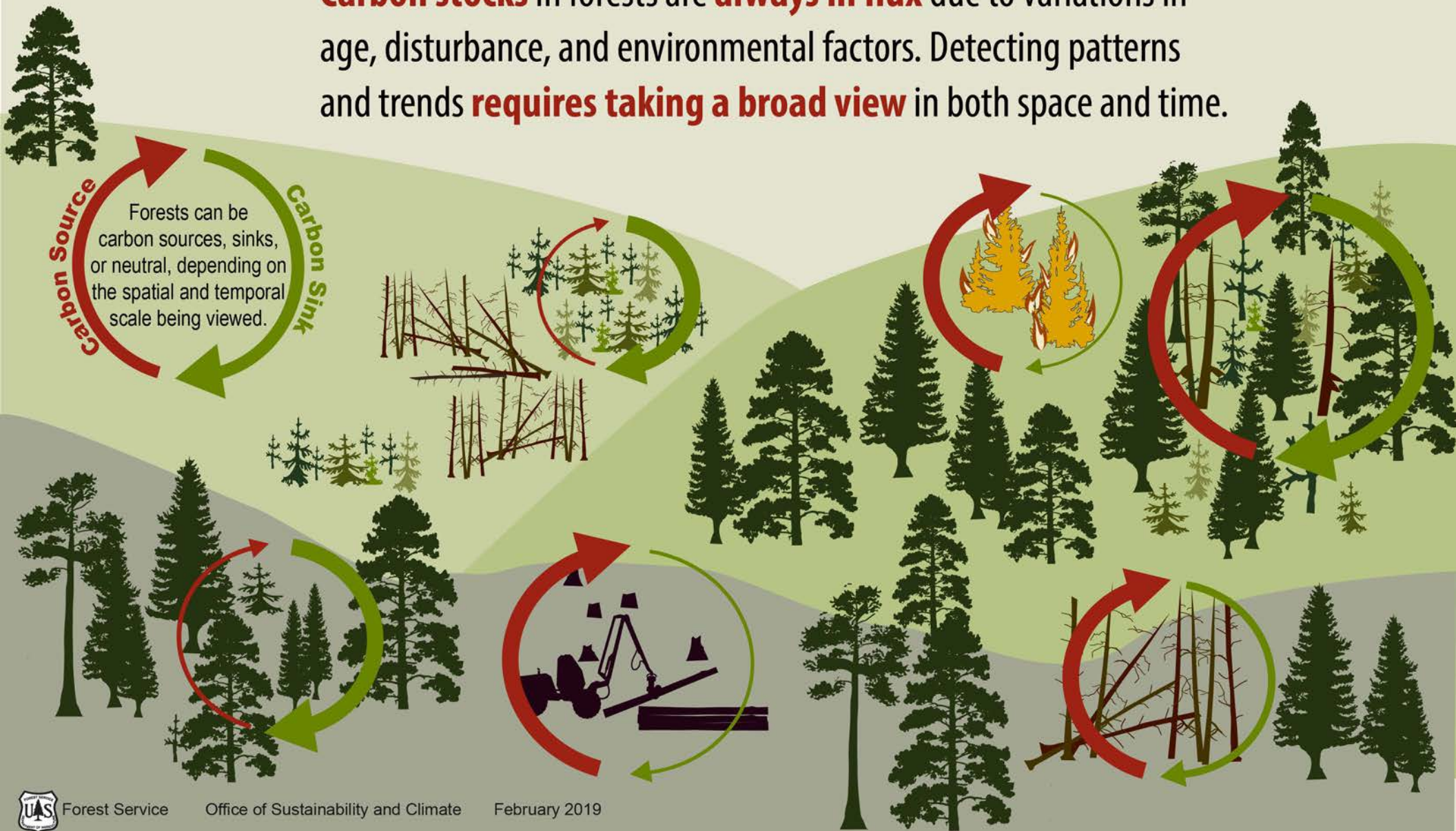
**Wood-based**

**1915**

**Fossil fuel-based**

# A spatial and temporal view | Carbon in Time and Space

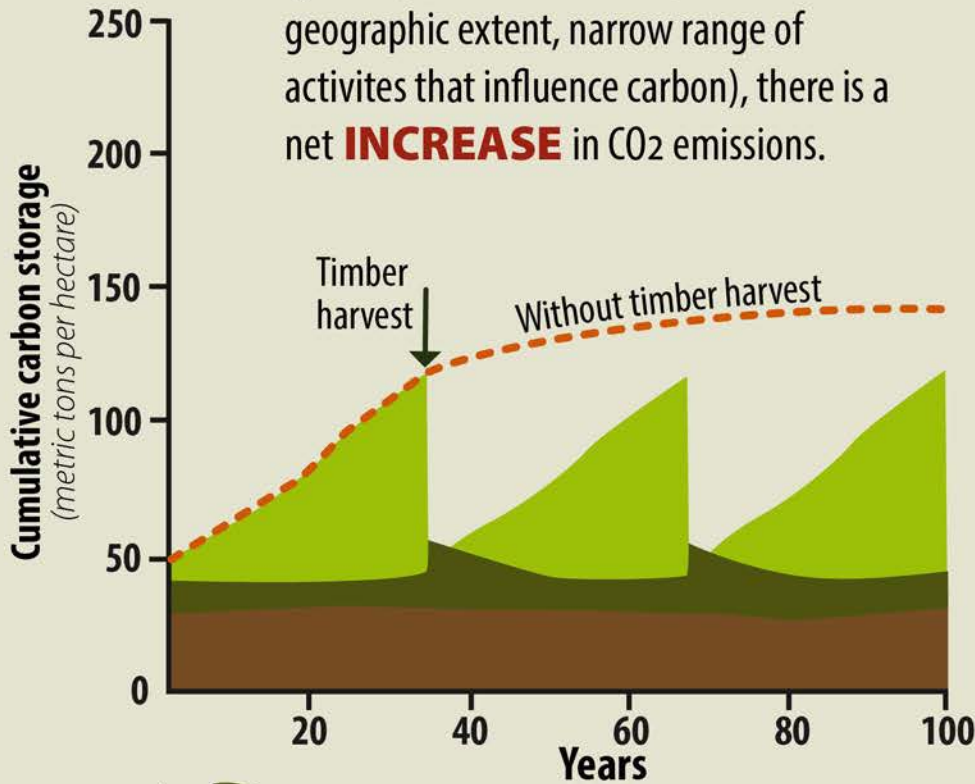
**Carbon stocks** in forests are **always in flux** due to variations in age, disturbance, and environmental factors. Detecting patterns and trends **requires taking a broad view** in both space and time.



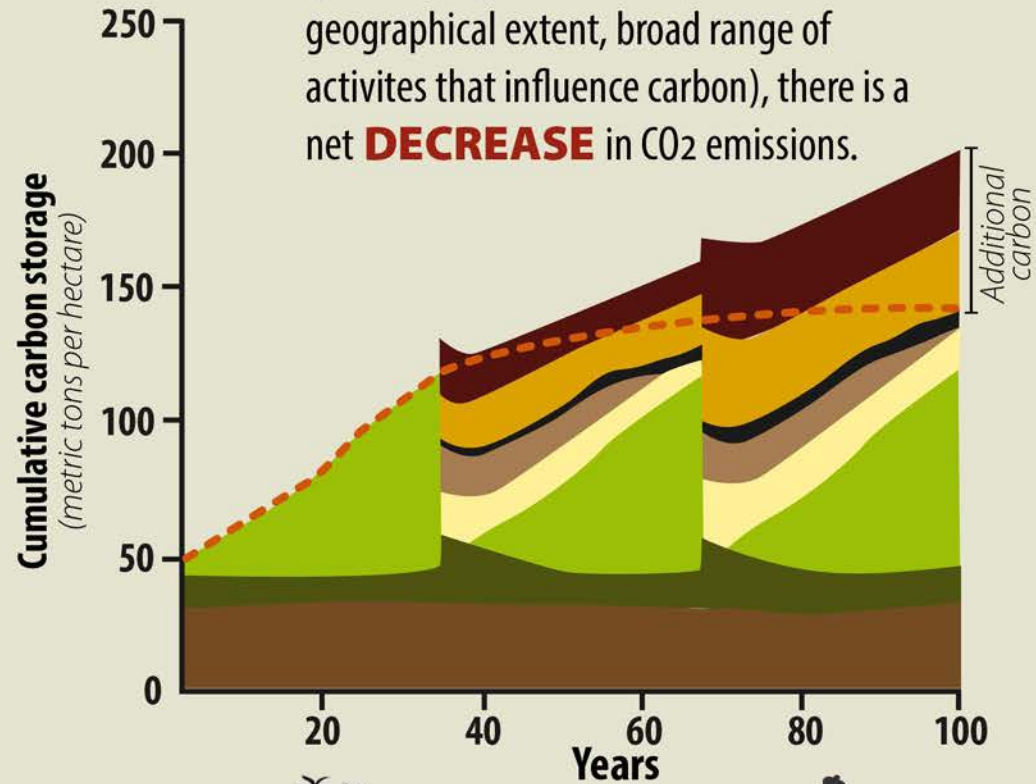
**Carbon BENEFITS in the Broad View**

# How Carbon Stacks Up

In the **NARROW VIEW** of the forest system (shorter time scale, smaller geographic extent, narrow range of activities that influence carbon), there is a net **INCREASE** in CO<sub>2</sub> emissions.



In the **BROAD VIEW** of the forest system (longer time scale, broader geographical extent, broad range of activities that influence carbon), there is a net **DECREASE** in CO<sub>2</sub> emissions.



Soil



Litter



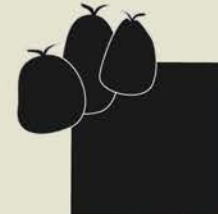
Trees



Long-lived forest products



Short-lived forest products



Landfill



Product substitution (building materials)



Energy substitution (bioenergy)