



Climate-Smart Forestry in the Southeast

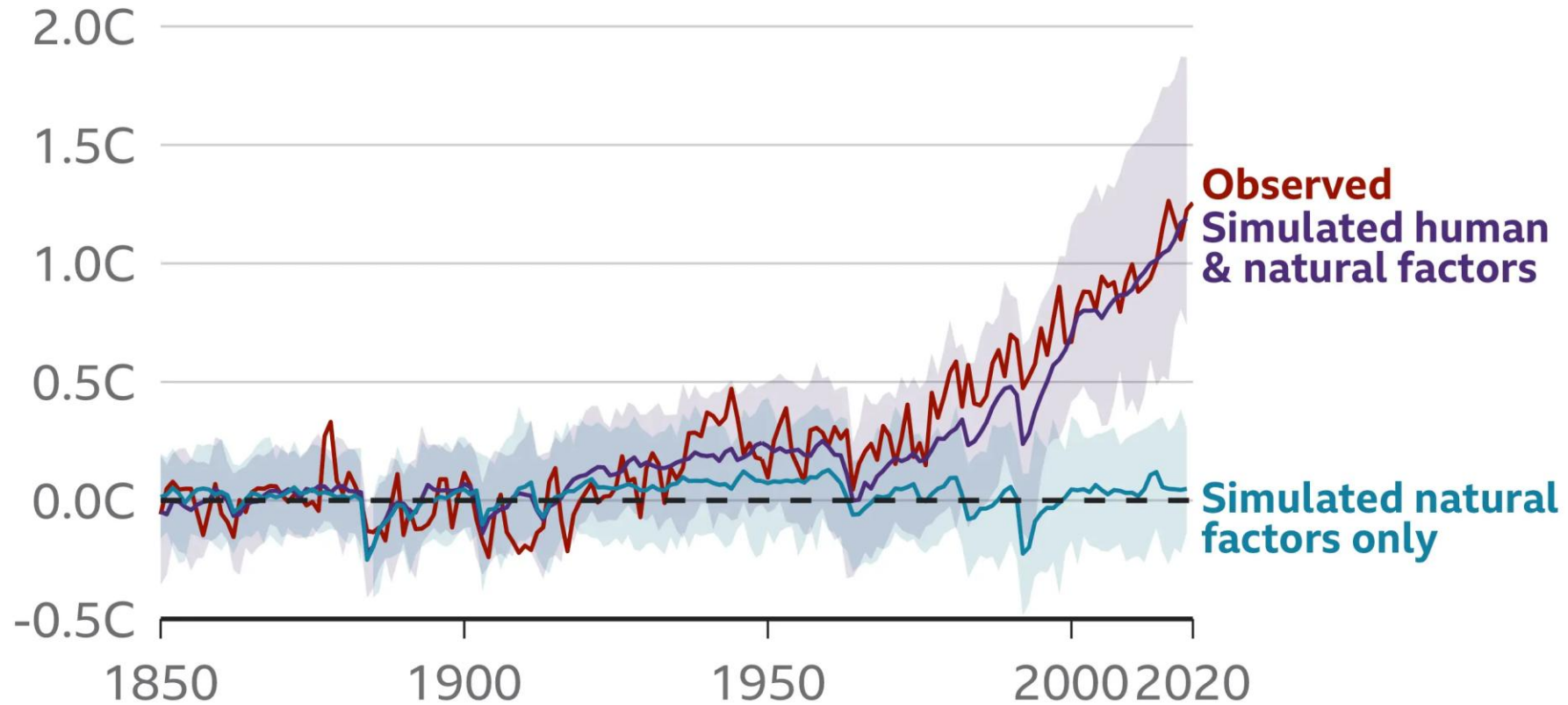
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Environmental Conservation

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Human influence has warmed the climate

Change in average global temperature relative to 1850-1900, showing observed temperatures and computer simulations



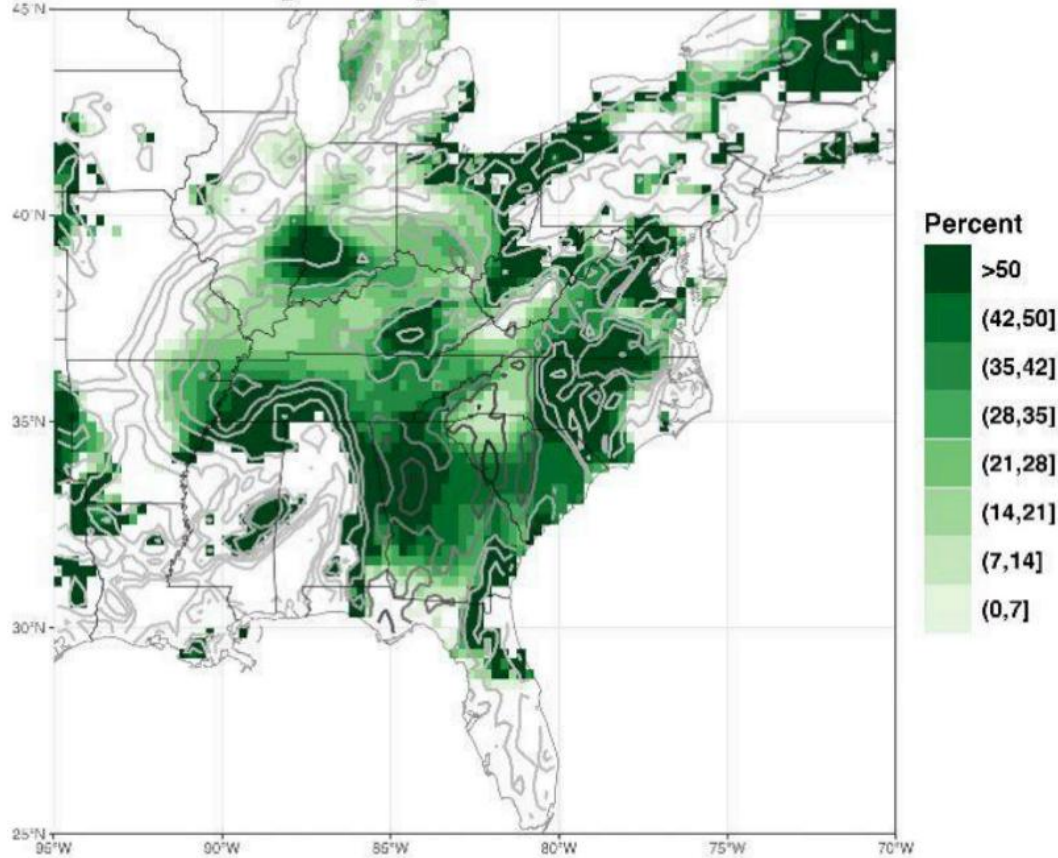
Note: Shaded areas show possible range for simulated scenarios

Source: IPCC, 2021: Summary for Policymakers



Changing frequency and intensity of disturbances are threatening these ecosystems.

Relative Change in Rainfall Magnitude due to Climate Change



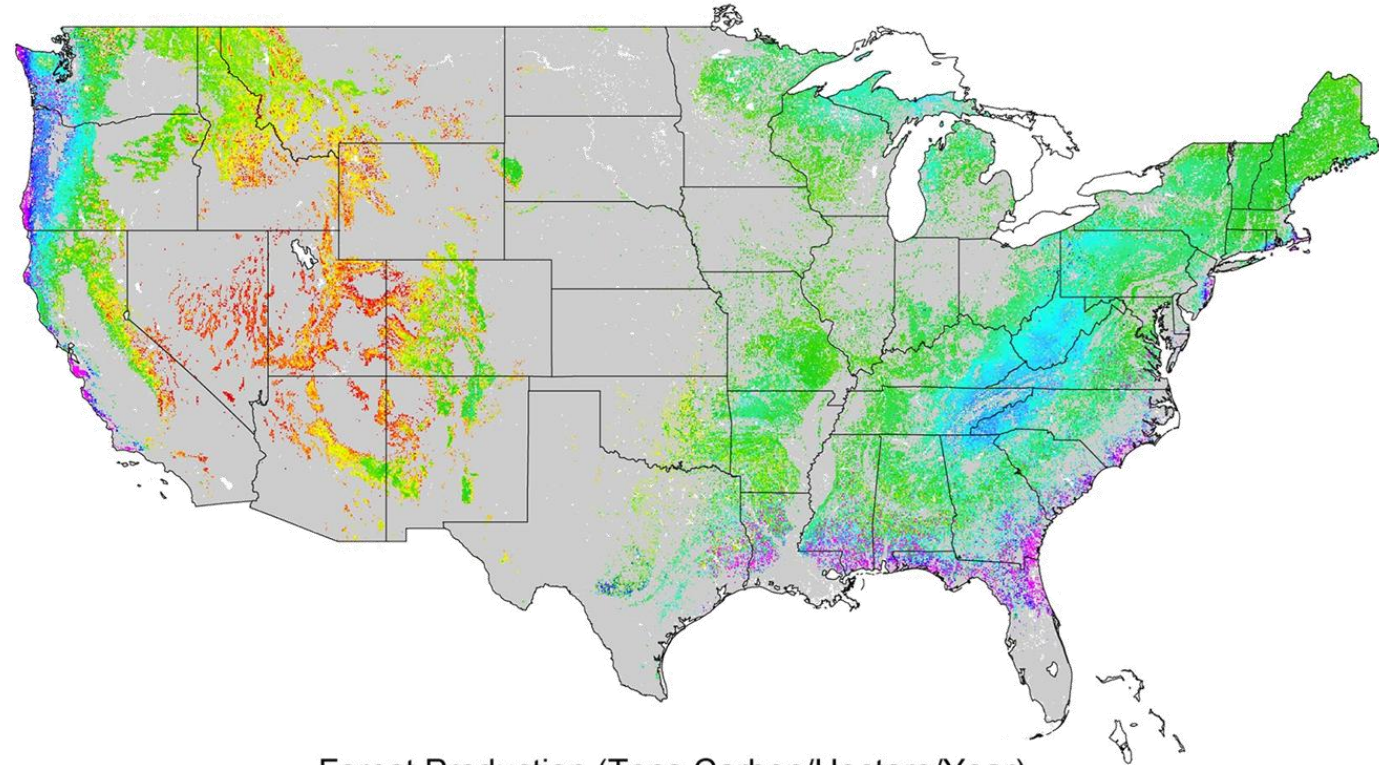
Risser et al., 2024



Impact of sea level rise on stand health



Forest Growth Provides an Important Carbon Sink



Forest Production (Tons Carbon/Hectare/Year)



National Climate
Assessment, 2018

USFS Goals and Strategies: Conserving Working Forestlands



Partnerships – Partnerships were essential to the development of the forest resource assessments and strategies



Education and outreach – States plan to provide information and technical assistance to various audiences from landowners to policymakers.



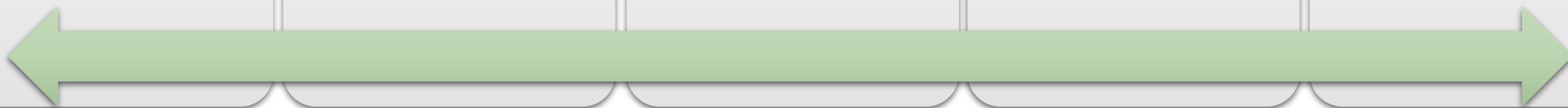
Sustainable forest management – State strategies emphasized managing forests sustainably and for multiple benefits.



Incentives and markets – Creating incentives and supporting markets helps to sustain working forest landscapes and their associated economic, environmental, and social benefits.



Information generation for climate change adaptation and mitigation; best practices for pest control, fire management, and the effects of forestry on water resources



Overview

1. Principles of Climate-Smart Forestry
2. Management Practices
3. Financing Options

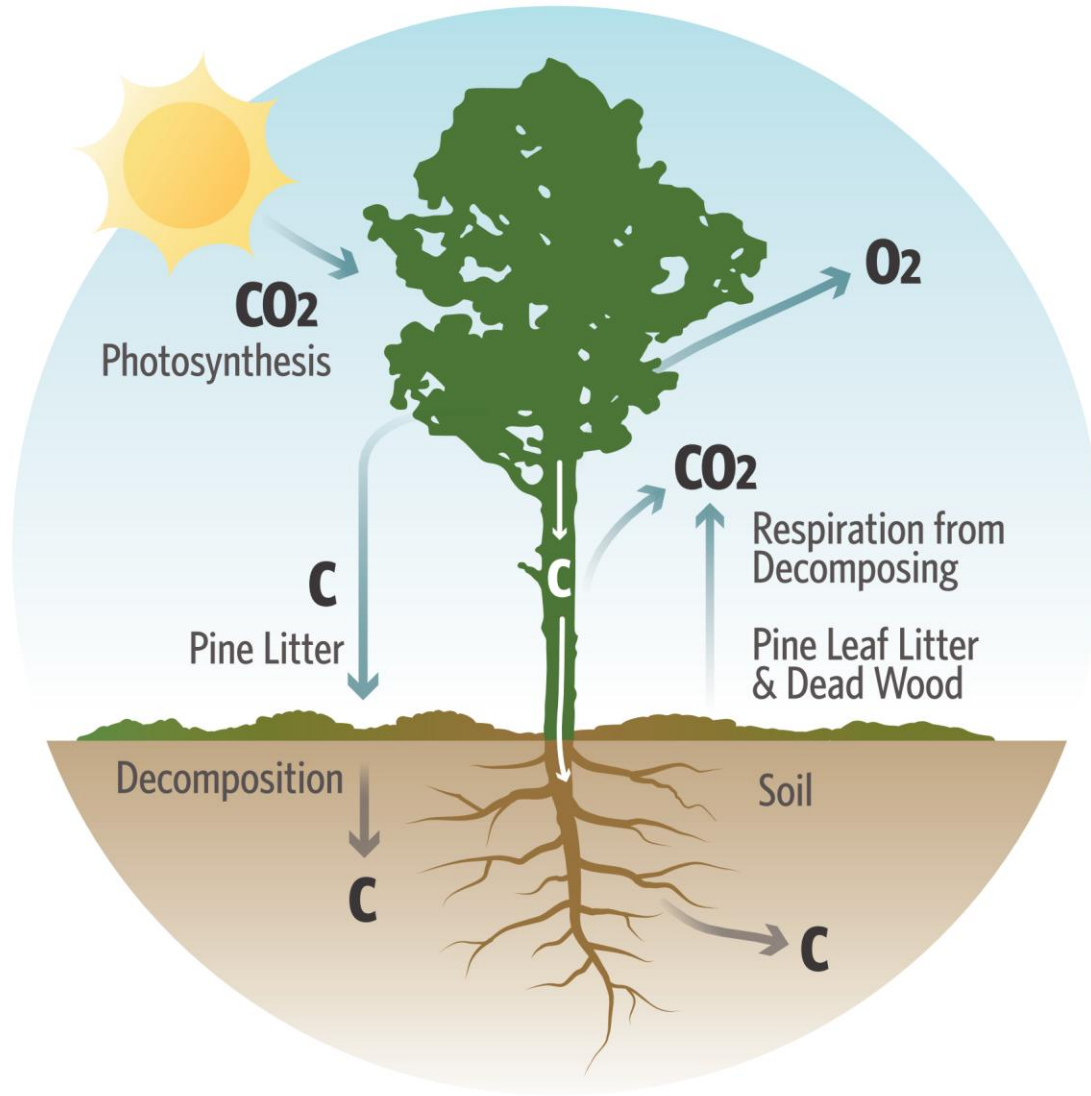
Purpose of this webinar:

- Brief overview of existing viewpoints of Climate-Smart Forestry
- Overview of available financing options



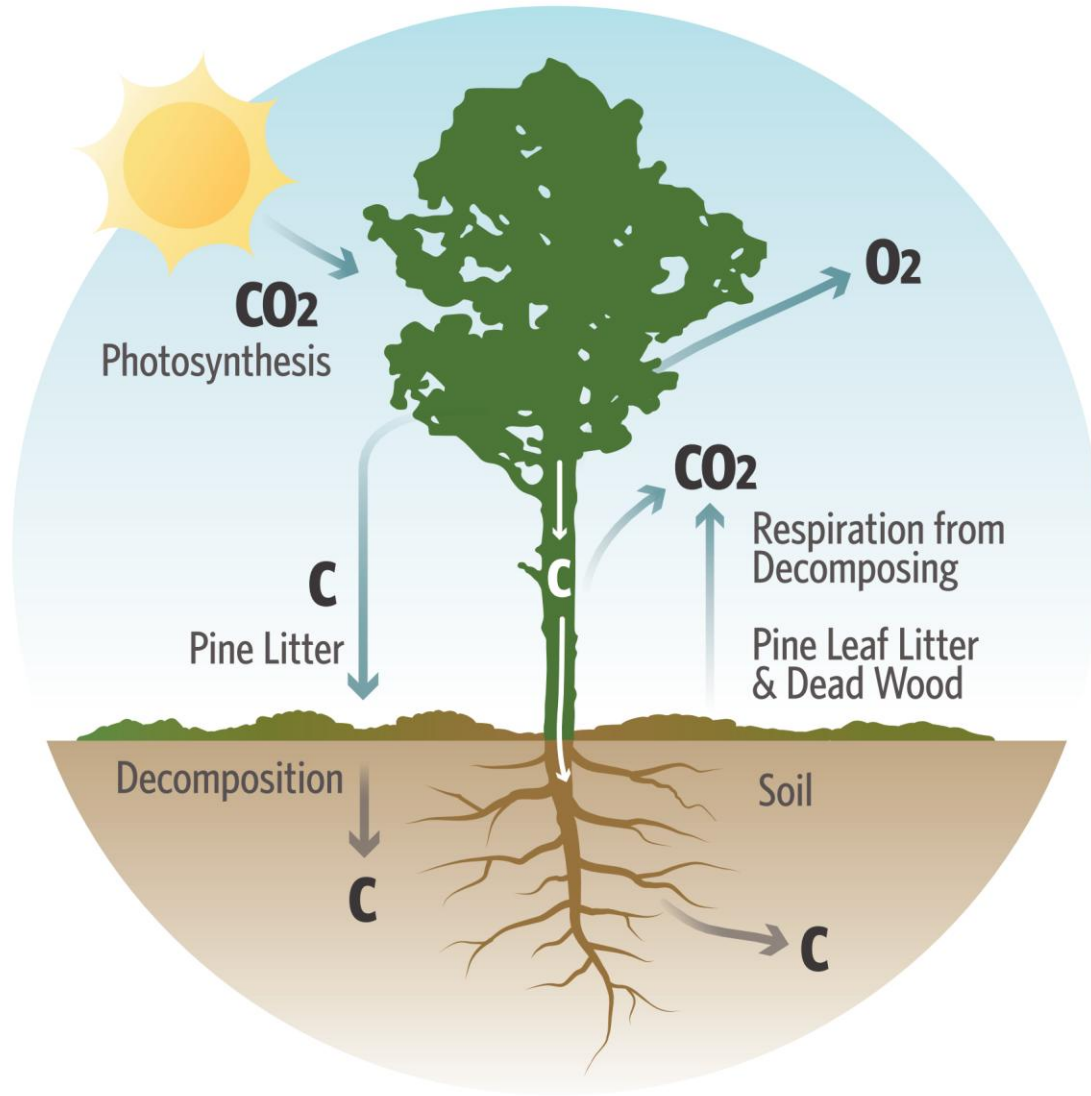
Principles

What is Climate-Smart forestry and how does it help the climate?



Forest carbon review

- Photosynthesis removes CO_2 from atmosphere, puts into biomass
- Plant and soil respiration returns some of that to atmosphere
- Wood/biomass is 50% carbon (C) by dry weight



Forest carbon review

- Foresters and carbon markets focus on aboveground biomass (trees)
- Roots also sequester carbon and ultimately build soil C
- Groundcover, litter and decaying organic matter also build soil C

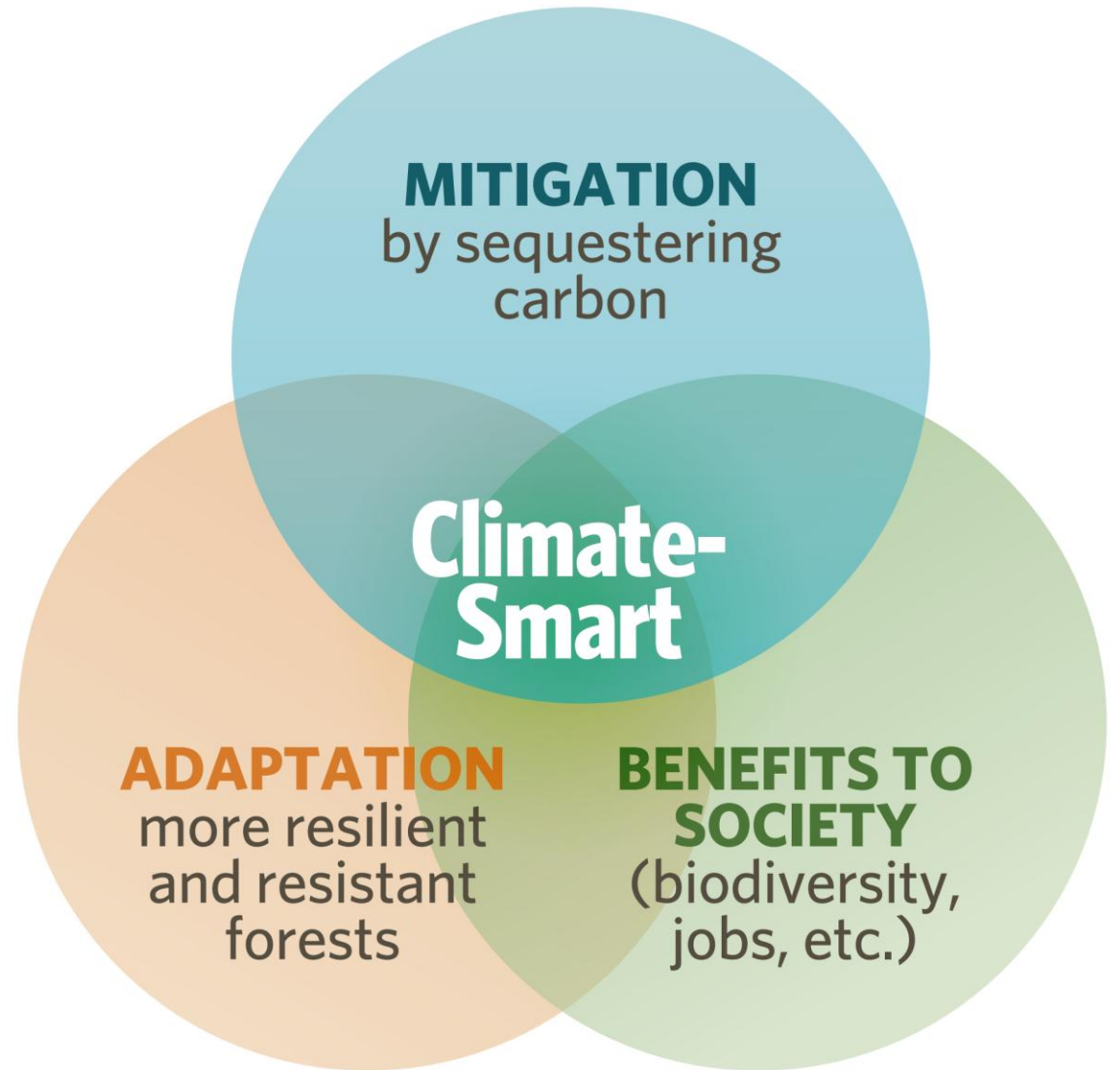


WHAT IS CLIMATE-SMART FORESTRY?

Climate-Smart forestry is an extension of sustainable forestry, where the priority is on adapting forests to climate change so that they can help mitigate climate change while providing benefits to people and nature. Given potential tradeoffs, the priority is placed on sequestering and storing carbon for the long term.



Climate – Smart Forestry



Climate-Smart Forestry – Mitigation

Establish new or restore existing forests

Prevent conversion to other land uses

Keep forests as forests

Keep trees on the ground longer

Extend rotations or go to uneven-aged management

Take care of the soil

Minimize disturbances like clearcutting

Enhance understory productivity

Groundcover restoration

Maintain tree productivity

Generate long-lived wood products

Climate-Smart: Carbon *and* Co-benefits



Wildlife Resources



Cultural Resources



Water filtration and storage



Carbon Sequestration



Aesthetics/Recreation



Sediment Retention

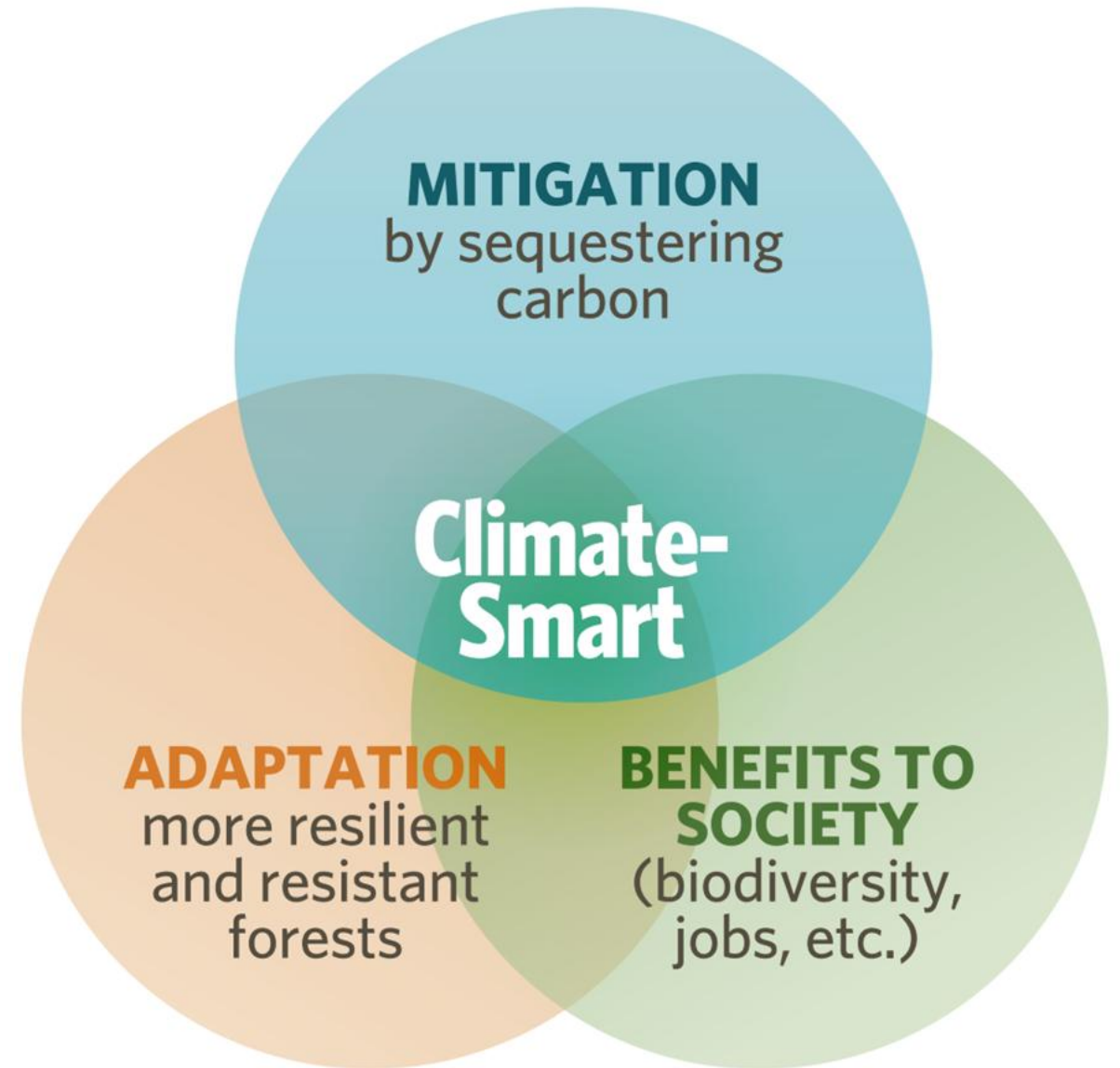


Biodiversity

Management

Using mitigation measures to address resilience and societal benefits:

Focus on carbon storage and minimizing large scale disturbances



Extended Rotations and Reduced Harvesting



Keep trees on the ground longer

- Extend rotations for additional carbon sequestration

Enhance understory productivity

- Increase biodiversity and carbon

Generate long-lived wood products

- Lumber, Mass timber



Ecological Forestry and Multi-age stands



Move from single age to multi-age stands

- Change harvest regimes/minimize clearcutting

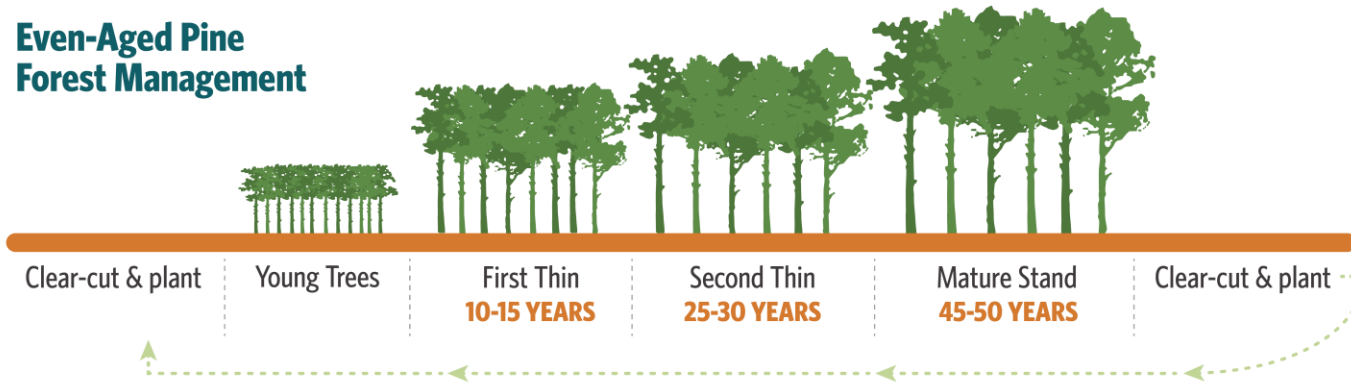
Take care of the soil

- Reduce carbon lost through soil disturbances

Groundcover restoration

- Increase biodiversity and carbon in groundcover

Even-Aged Pine Forest Management



Transitioning to Uneven-Aged Forest Management with Longleaf Pine



Benefits and Drivers



Consistent carbon storage and moving carbon into the soil for long term storage

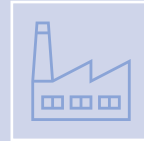


Demand for durable carbon and removals



More control over the impact of disturbances

Prescribed fire
Mitigate impacts of wind and disease



Reduction in risk to natural climate solutions and carbon offsets



Insulated from large market swings



Options to harvest products each year with multi-age management



Financing

How do pay for Climate-Smart forestry
in the long run?



Partnerships for Climate-Smart Commodities Projects

Expanding Climate-Smart Commodity Markets



All Climate-Smart Projects



55
States &
Territories



135
Projects



102
Major
Commodities



197
Practices



\$3.03 B
Federal
Funding*

Forestry and Forest Products



44
States &
Territories



10
Projects



1
Major
Commodities



68
Practices



\$309.12 M
Federal
Funding*

Climate-Smart Forestry
Goal: Move land into the next level of management

**RESTORATION
AND
AFFORESTATION**

- Tree Establishment
- Restoration planting

IMPROVEMENT

- Forest Stand Improvement
- Tree Establishment
- Prescribed Fire

MAINTENANCE

- Selected Harvest
- Prolong Rotation
- Longleaf Pine Establishment



Forest Stand Improvement (666)

Specific Implementation (when applicable): Not applicable

Summary of Expected Mitigation Benefits: Enhanced carbon storage in forests and avoided wildfire emissions. Selected references: Kalies et al., Kern et al., 2021; 2016; Ontl et al., 2020

Greenhouse Gases Mitigated: Carbon dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O)

Tree/Shrub Establishment (612)

Specific Implementation (when applicable): Not applicable

Summary of Expected Mitigation Benefits: Woody biomass carbon accumulation, change in soil organic matter carbon due to ceasing tillage, increased carbon inputs from plant residues, and decreased nitrous oxide emissions from decreased synthetic fertilizers. Selected References: Hulvey et al., 2013; Kirschbaum et al., 2024; Ontl et al., 2020

Greenhouse Gases Mitigated: Carbon dioxide (CO₂), Nitrous oxide (N₂O)

Prescribed Burning (338)

Specific Implementation (when applicable): Conducting a prescribed burn on a forested ecosystem with the purpose of reducing wildfire hazards in an area with increased risk of wildfire

Summary of Expected Mitigation Benefits: Reduced risks and severity of catastrophic wildfire, a large source of CO₂ and other GHG emissions, as well as potential benefits from increased carbon sequestration from maintained and enhanced plant community heterogeneity. Selected References: Flanagan et al., 2019; Volkova et al., 2021; Wiedinmyer & Hurteau, 2010

Greenhouse Gases Mitigated: Carbon dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O)

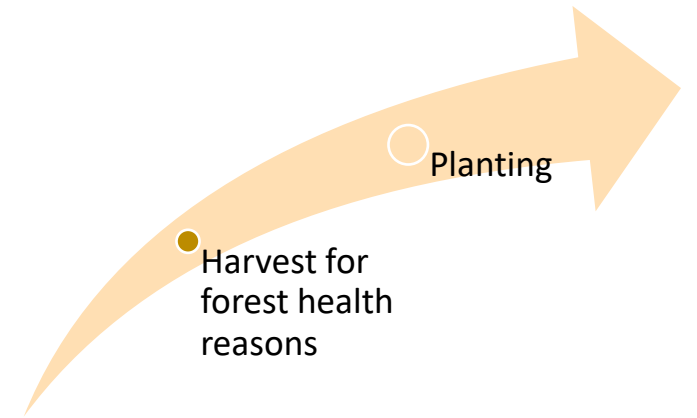
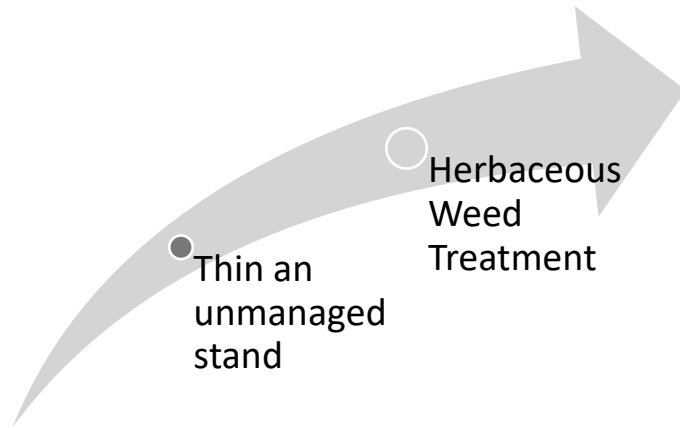
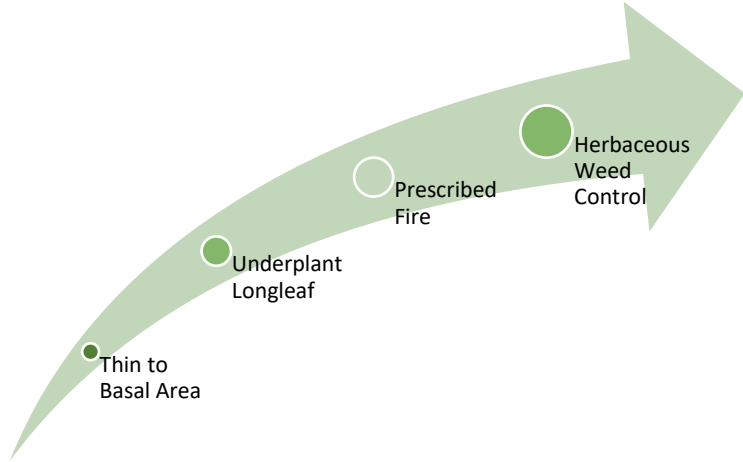
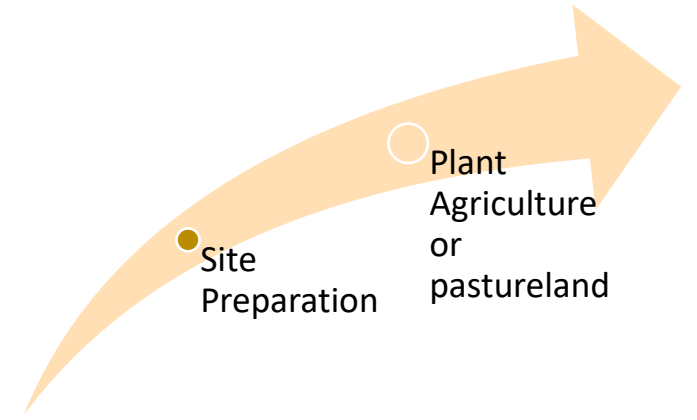
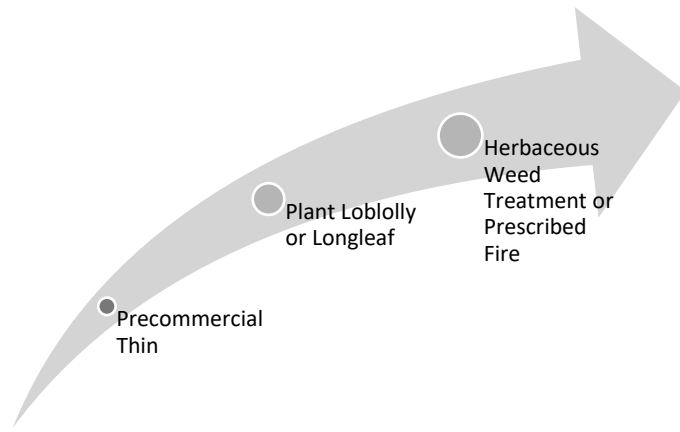
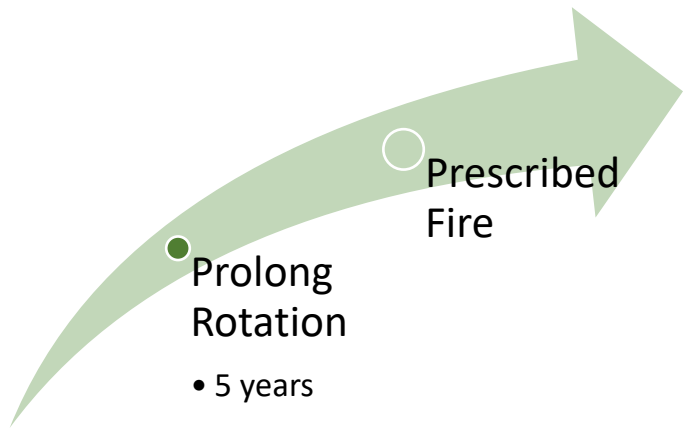
Herbaceous Weed Treatment (315)

Specific Implementation (when applicable): Removal of herbaceous weeds to release desired deep rooted perennial species.

Summary of Expected Mitigation Benefits: Herbaceous weed plant communities conversion to perennial dominated plant communities, which can result in increased soil organic carbon. Selected References: Bradley, B., et al., 2006; Koteen et al., 2011; Yang et al., 2019

Greenhouse Gases Mitigated: Carbon dioxide (CO₂)

USDA NRCS Practices for Climate Change Mitigation

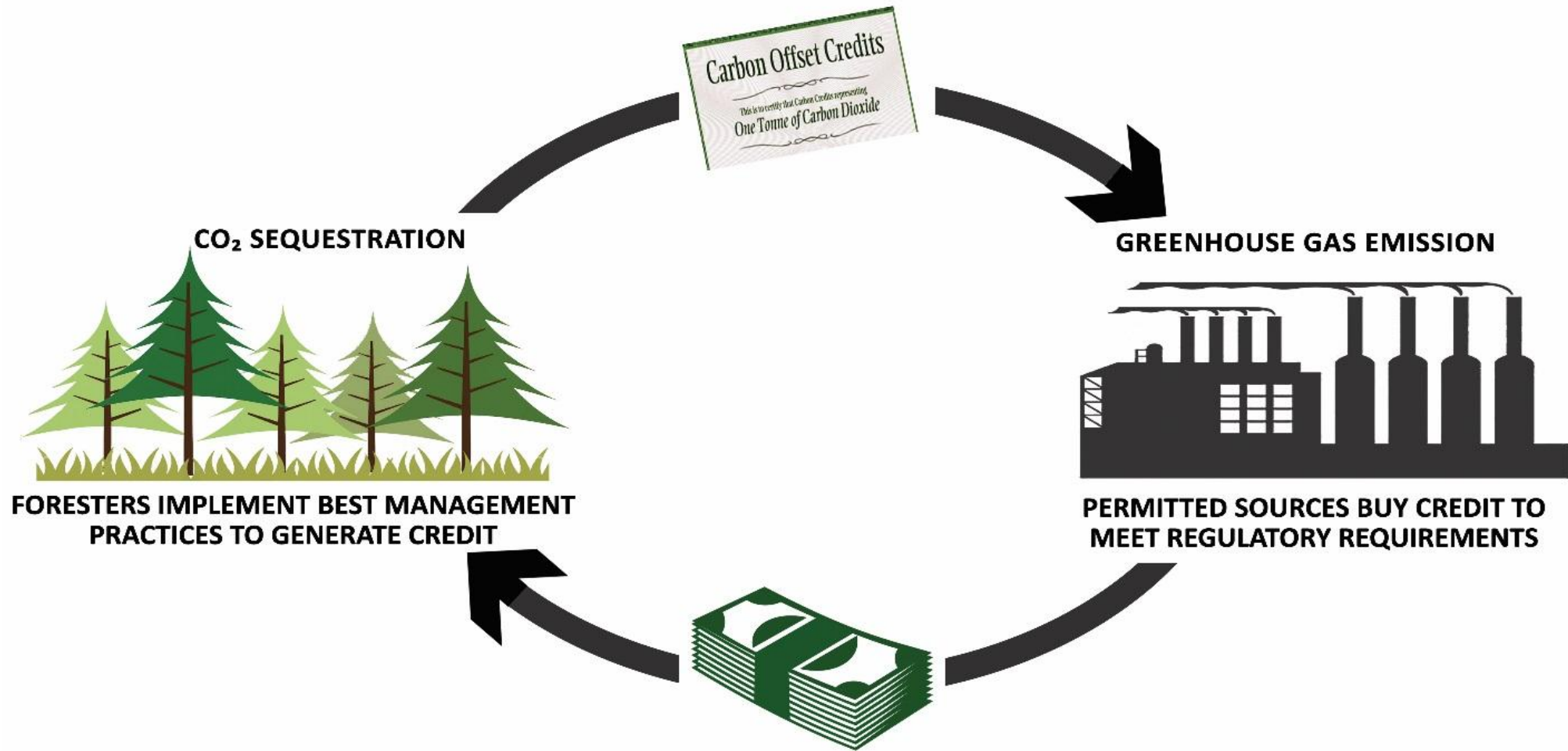


Maintenance

Improvement

Restoration

Voluntary Carbon Market Process

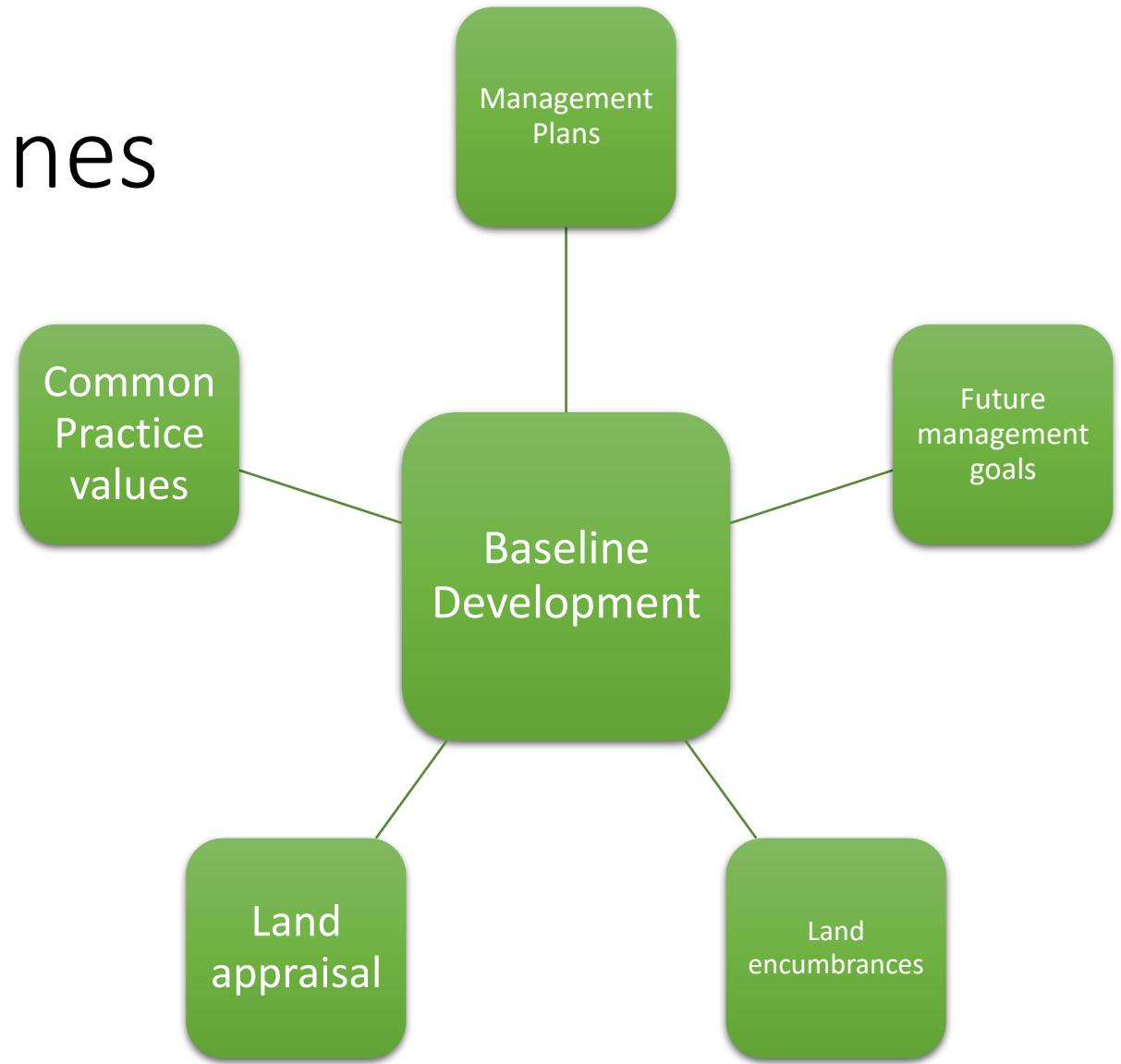


Carbon Markets: Additionality and Baselines

The new activity implemented in the project area must be *different* than **business as usual (BAU)**

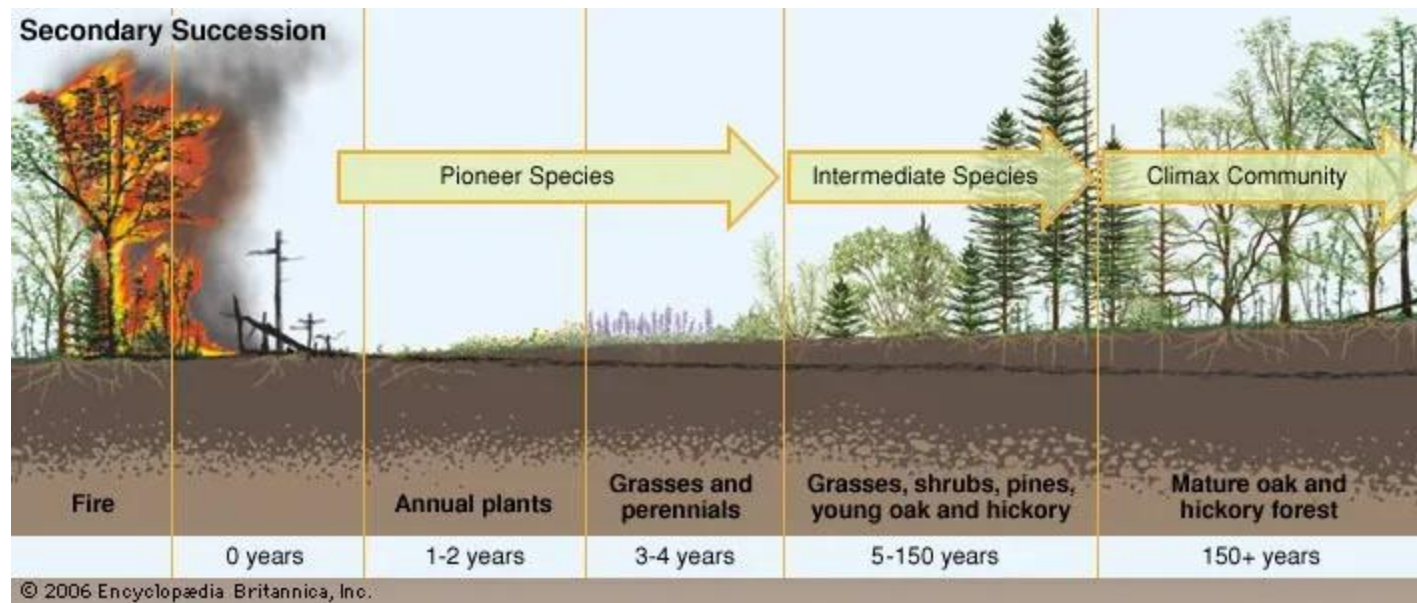
Payments from carbon credits must provide the financial incentive to the landowner to implement new management

Baseline: The amount of carbon that would have been sequestered in the project area if a carbon project was not implemented



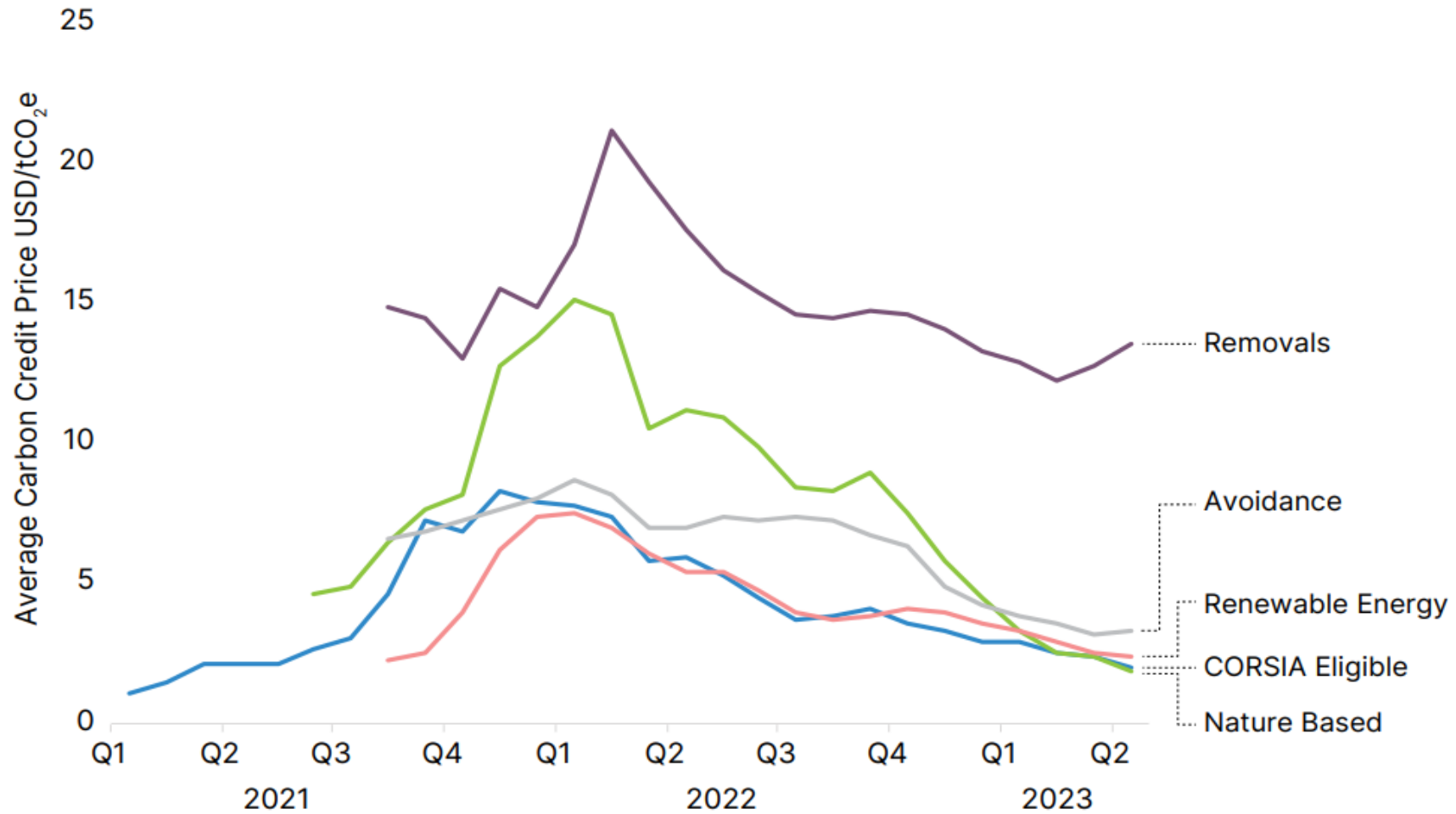
Permanence (Carbon Durability)

- Retaining carbon on the landscape and increasing carbon storage
 - Protocols practically capture this by having carbon projects that last 40-100 years
 - Easements may be an option to increase durability/investor
 - Managing to reduce frequent, large-scale disturbances
 - Payments are typically greater for projects that show strong durability



Paine, 2019

Pricing Trends for Carbon Offset Credits



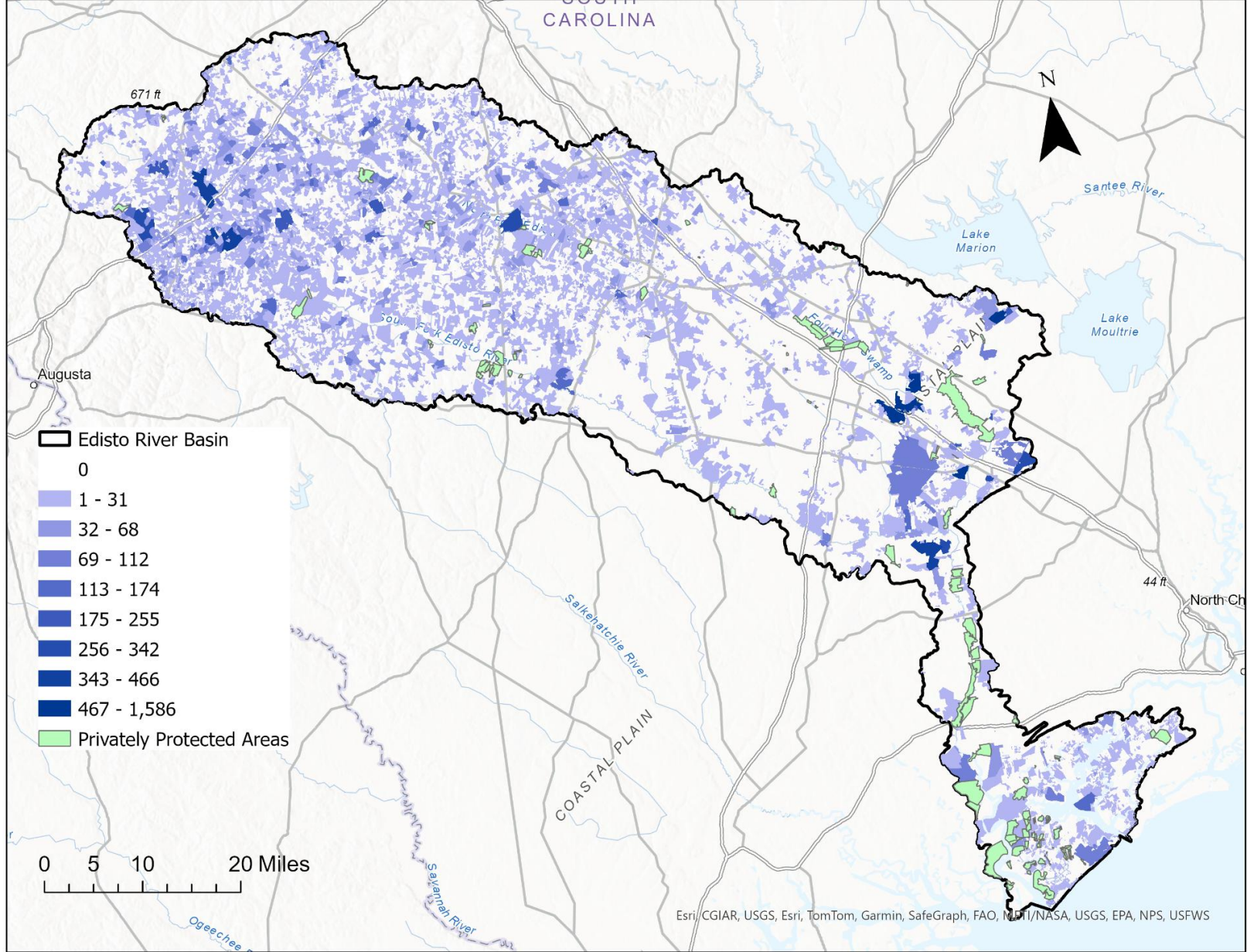
Data: World Bank: State of Carbon Markets 2023

Additionality for Ecosystem Services?

- Carbon Projects require additionality and permanence to value avoided and removed carbon credits
- To value ES in a similar way, methods to quantify additionality must be implemented to be valued by investors
- Could help increase the value of a carbon credit or create new ES credits

CO-BENEFIT STATUS	2021			2022			2023 (YTD)
	VOLUME (MtCO ₂ e)	VALUE (USD)	PRICE (USD)	VOLUME (MtCO ₂ e)	VALUE (USD)	PRICE (USD)	PRICE (USD)
ALL VCM	260.2	\$1.15Bn	\$4.41	121.5	\$988M	\$8.13	\$7.59
NO CO-BENEFITS	97.1	\$327M	\$3.37	66.2	393M	\$5.94	\$6.07
HAS CO-BENEFITS	163.1	\$819M	\$5.02	55.4	587M	\$10.60	\$10.08

Ecosystem Marketplace, 2023



Priority Areas for Ecosystem Service Conservation at the Parcel Level

Sediment Retention and Water Retention

- Near Agriculture and Urban areas to reduce runoff and trap sediments
- In areas with agronomic forestry
- Areas with greater slope

	Parcel Total Area	Modeled TA Total Area
All Parcels	719,018 acres	23,709 acres
Parcels greater than 20 acres	70,509 acres	3,763 acres





- Need solutions for smaller landowners
- Need widely accepted baseline data for conservation project implementation

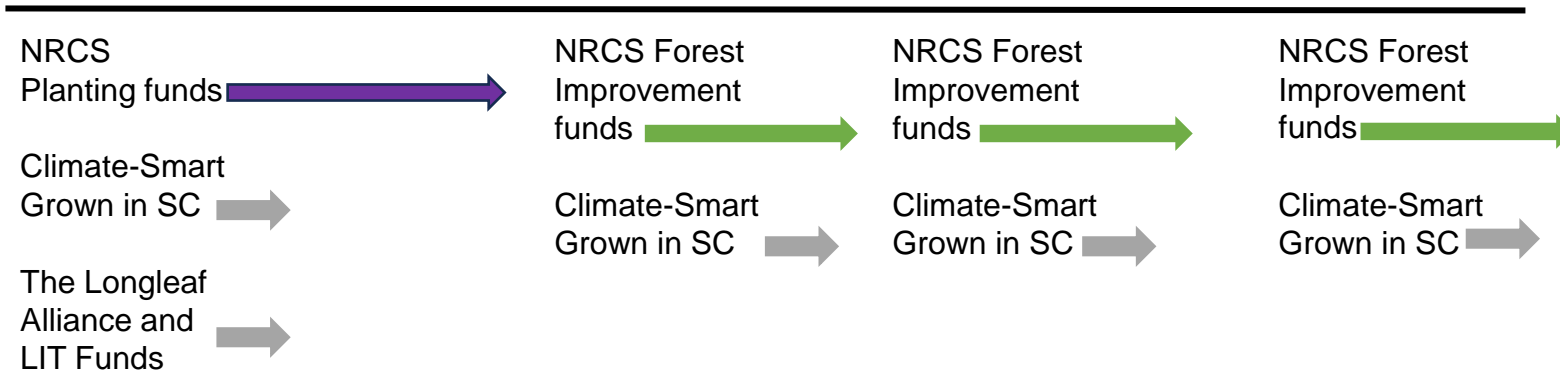
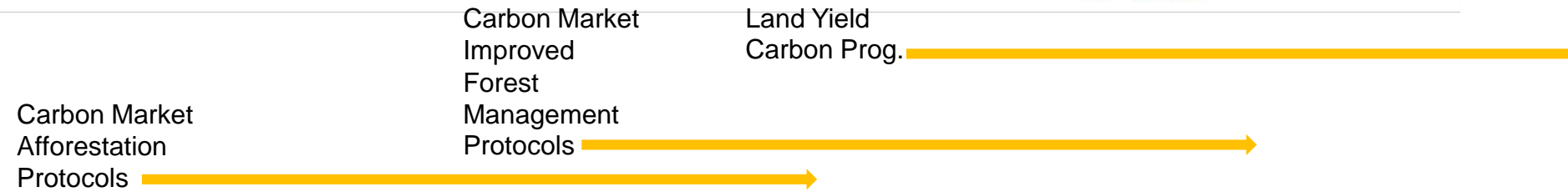
Clay, L., Motallebi, M., & O'Halloran, T. L. (2024). Quantifying Ecosystem Services to Maximize Co-Benefits under Market-Based Conservation Solutions in the Edisto River Basin, South Carolina. *Forests* (19994907), 15(10).

Transitioning to Uneven-Aged Forest Management with Longleaf Pine



Program Length

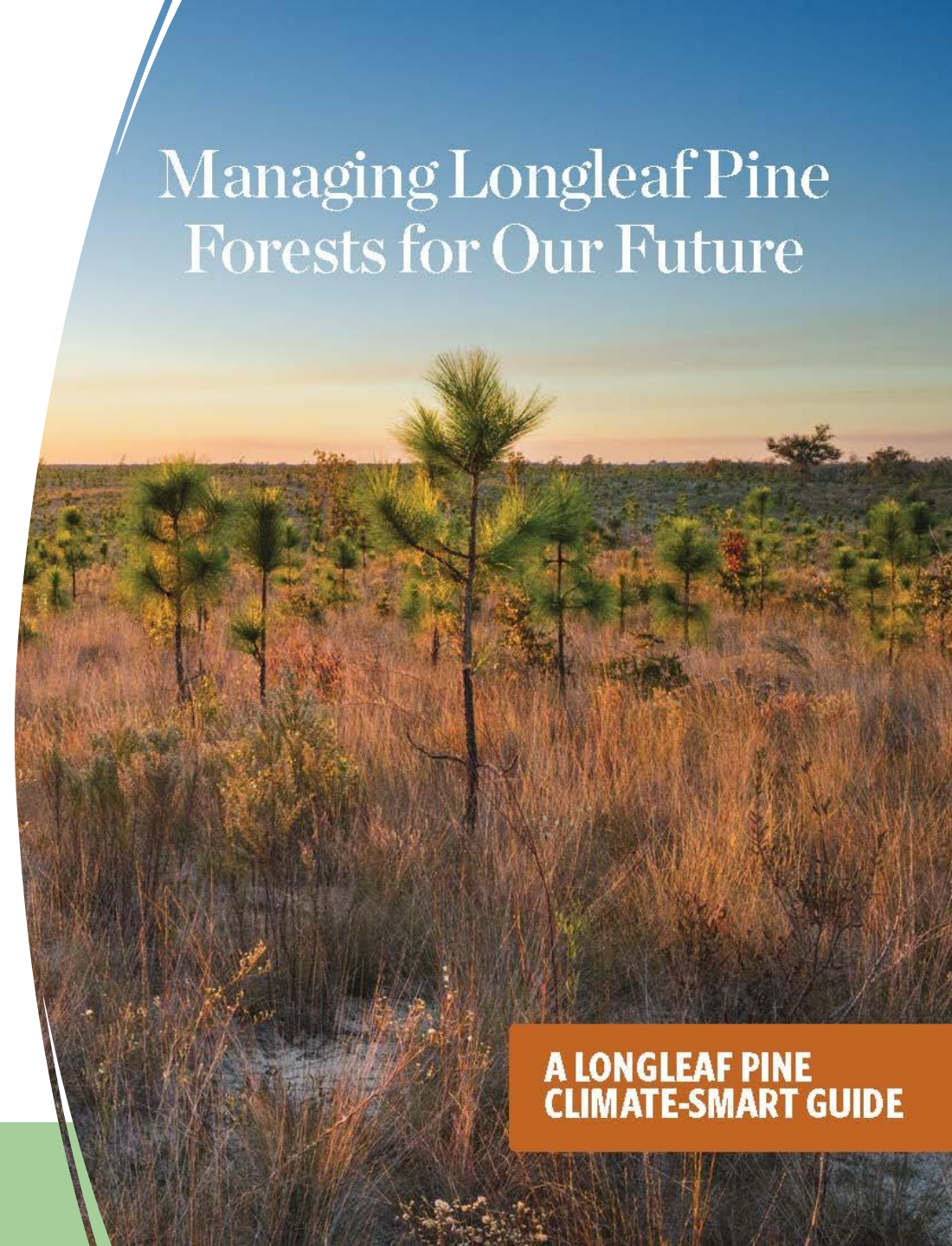
-  40 years
-  15 years
-  10 years
-  2 years



Longleaf Climate-Smart Forestry Guide



Managing Longleaf Pine
Forests for Our Future



**A LONGLEAF PINE
CLIMATE-SMART GUIDE**

Questions?



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