FUNCTIONAL FORESTS

The Role of California Forests in Achieving Statewide Carbon Neutrality

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BACKGROUND

In 2018, Governor Jerry Brown issued Executive Order B-55-18, pledging California to achieve statewide carbon neutrality by 2045. To achieve this ambitious goal, the State needs to both reduce emissions and remove carbon dioxide (CO_2) from the atmosphere.

California's forests play an important role in carbon storage in the State. However, increasing drought severity and intensity of wildfires threatens the effectiveness of the State's forests as a carbon sink. To ensure that California's forests continue to help offset the state's carbon emissions, State policymakers and land managers will need to prioritize carbon storage in forest management and in climate policy (Liang et al., 2018).

Figure 1. Land type across California. (USDA, 2020)

What is Forest Management?
Grow only: No active management.
Clear-cutting: Most or all trees in an area are cut and removed.
Thinning: The partial removal of targeted biomass in order to achieve management priorities such as increased tree growth, reductions in wildfire severity and other ecosystem and human health co-benefits.

OBJECTIVES

1. Identify forest management practices that cost-effectively store carbon.
2. Identify policies to incentivize these forest management practices and support carbon neutrality.

MANAGEMENT ASSUMPTIONS

Initial assumptions about how much forest management is happening in the State determines the amount of baseline carbon storage. We use two different baselines to model additional forest carbon:

BAU: Based on an approximation of the current amount of management taking place within California forests

CARB: Modified to be similar to the California Air Resources Board methodology that assumes management on all forested land in the State

APPROACH

We created a marginal cost curve (MCC) to calculate the cost of carbon storage through forest management in California. We used the U.S. Forest Service Biosum model to simulate the effects of management practices on the the growth of forests over time. We estimated the present value of costs and carbon implications for 31 different treatments across California over 30 years.

FOUR STEPS TO CREATING A MARGINAL COST CURVE:

1 Determine Costs
Total cost of each treatment for a given forest plot (5,000 acres) = harvest costs + transportation costs + permitting costs

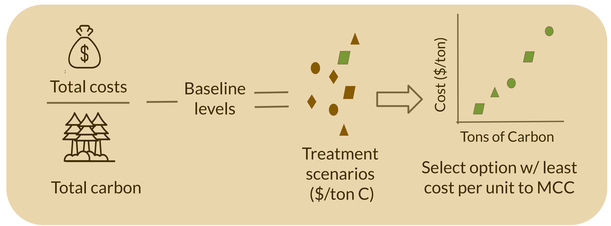
2 Model Data
Model the costs and carbon implications of 31 treatments to over 2,000, 5,000 acre plots

2,289 plots → 31 treatments → >60,000 scenarios

3 Calculate Relative Carbon
Subtract baseline carbon storage representative of current management from each modeled result to only account for additional carbon.

4 Select Best Treatments
Select the treatment for each plot that yields the **lowest per-unit carbon costs.** If no treatments for a plot yielded an increase in carbon relative to the baseline, that plot was not selected. We then **arranged the treatments in order of cost ($/ton)** to generate the MCC.

MCC Workflow: Process to Select a Management Strategy for a Single Plot



POLICY IMPLICATIONS

We evaluated the State forest carbon offset program and federal conservation incentive programs for their ability to motivate cost-effective forest management for increased carbon storage.

Forest policy should be motivated by co-benefits in addition to carbon storage

Co-benefits approach could be modeled on existing federal incentive-based policies

State should consider a statewide forest carbon inventory instead of project-level accounting

RESULTS: MCC

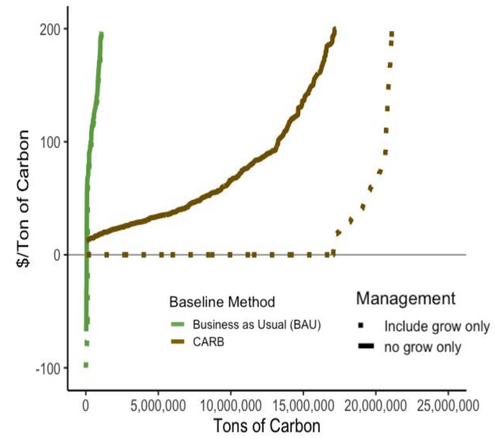


Figure 2. Marginal cost curves of simulated forest management in California using two different baselines that include and exclude grow-only as a management strategy.

Baseline matters.
Scenarios relative to a CARB baseline stored more carbon at a lower cost than scenarios relative to a BAU baseline.

Grow-only management stores the most carbon.
Grow-only has the least management costs to store the most carbon.

MAIN TAKEAWAYS

Forest management may be a costly abatement strategy
Additional carbon storage through forest management contributes a relatively small amount given a statewide goal to store 15.5 million tons of carbon through forest management per year by 2045.

Management assumptions are important
How much and what type of management the State chooses as its baseline determines the amount of additional forest carbon provided by a treatment.

RECOMMENDATIONS

1. Incorporate the co-benefits of forest management into climate policy– managing forests for carbon & other ecosystem services may make it more economically viable
2. Utilize a statewide forest carbon inventory to measure the increase in carbon storage from forest management projects
3. Compare the MCCs of other industries to the MCC of forest management to design cost-effective climate policy

LIMITATIONS

Inclusion of Avoided Fire Emissions: Did not include avoided fire emissions, which could increase carbon storage

Relatively Short Time Frame: Do not account for carbon storage that occurs after 30 years

Incomplete Wood Products Carbon Life Cycle Assessment: Carbon substitution benefits from burned bioenergy are not included

FURTHER INFORMATION

Please visit our project website for additional information: https://woodwisegp.weebly.com/

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