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Contact: Sage Welch
615 715 6714

Maintaining California's iconic landscapes is critical to meet state climate goals

First-of-its-kind report finds land-based strategies can slash emissions, generate billions in economic value—but state must act quickly

SAN FRANCISCO – Investing in the capacity of California's lands to store carbon can cut significant emissions and deliver billions in economic value, while reducing the risk of wildfire – but the state must act quickly to avoid these lands becoming a greater source of emissions as climate impacts take hold. That's a finding of a report, released today from nonpartisan, nonprofit organizations Next 10 and The Nature Conservancy. The report comes as the California Air Resources Board prepares to meet to reconsider the emissions reduction goal for the state's natural and working lands.

"The latest report from the Intergovernmental Panel on Climate Change made clear that we must act immediately to stave off the worst impacts of climate change," said F. Noel Perry, founder of Next 10. "While scientists and entrepreneurs across the globe scramble to develop and scale new technologies that can remove carbon from the atmosphere, a cost-effective and proven solution sits right in front of us. This report begs the question: why aren't we investing more in this sector?"

The study, [Toward a Carbon Neutral California: Economic and Climate Benefits of Land Use Interventions](#), found that interventions on natural and working lands (forests, farms and rangelands) can contribute 2.5 times the emissions reductions expected from the residential and commercial sectors combined, and up to 80 percent of the industrial and agricultural emissions reductions expected—both by 2050.

"By implementing land use strategies that are currently available, our forests, rangelands, and farmlands can pull carbon out of the atmosphere and achieve five to seven percent of the emissions reductions needed by 2050," said Dick Cameron of The Nature Conservancy, who conducted the study in collaboration with researchers from U.C. Santa Barbara and Bowdoin College, on behalf of Next 10. "That is why it is critical that California includes, and makes significant investments, in its natural and working lands as part of a long-term climate strategy."



The detailed report models eight potential land use interventions including land conservation, restoration and land management practices under two different climate scenarios to measure their potential to cut emissions out to 2030, 2050 and 2100. While these reflect only a subset of land management practices that can reduce emissions, it was found that these strategies can collectively achieve emissions reductions, despite a decline in the ability of the land to store carbon over the course of the century due to the impacts of climate change. Were the state to not invest in this sector, not only would it forfeit the potential benefits, these lands would become a carbon liability, releasing more emissions over time due to impacts like drought and wildfires. However, if managed wisely, these lands could become a carbon sink.

“Decisions we make now will determine if our lands become a net *source* of emissions—making it harder to meet our climate goals and protect lives and property during wildfires—or a net *sink* for emissions,” said Perry. “This study shows we can’t afford to ignore the impact of land-based strategies.”

Land use strategies are cost-effective

The study found land-use strategies can also deliver significant economic benefits – with the interventions analyzed producing as much as \$17.2 billion in economic value by 2050, including the benefits of not emitting greenhouse gases and avoided costs from climate change damages.

“Next 10 research over the years has shown that reducing emissions and increasing efficiency can be good for the economy,” said Perry. “So, it’s no surprise to us that maximizing the carbon storage potential of our lands also has a return on investment. But, we are surprised by just how cost-competitive these strategies are, even without accounting for the many other benefits they can provide.”

The researchers found that for every dollar spent on implementing land-use strategies, close to fifty cents will be recouped in economic benefits. And that’s without accounting for other positive impacts, like the public health and recreational benefits of maintaining natural land near cities, or the benefits of more compact growth patterns, such as shorter commutes. Add these and you begin to see just how valuable these strategies can be as California searches for solutions that cut emissions while increasing quality of life.

“Many of these strategies achieve carbon reductions at relatively low cost, and that’s before accounting for benefits like avoided costs for fire suppression and floods,” says Andrew Plantinga, a Professor in the Bren School of Environmental Science and Management at UC Santa Barbara, who contributed to the economic analysis. “Even with some of the more expensive options—like avoided conversion where you have relatively high opportunity costs—you get a cost-per-ton of carbon reduction that is actually cheaper than all but one of the eight state Climate Investments Programs being administered in 2017,” added Plantinga.

Other topline findings of the report include:



- Land use interventions are the only current proven, scalable method to create negative greenhouse gas emissions—something that will be needed for the state to become carbon neutral – and then carbon negative—from 2045 onwards.
- Despite naturally declining carbon stocks under both the “average” and “hot-dry” climate futures modeled, the interventions can collectively cut over 260 million metric tons of CO₂ by 2050.
 - This represents five percent of the emissions reductions the state needs to meet its 2050 climate goal. This percentage is even higher (7%) when removing the strategies that reduce the severity of wildfires, which drive up overall emissions in the short term, but provide significant reductions by 2100. Without these strategies, land use interventions can help the state achieve up to 14 percent of the reductions needed by 2030.
 - Even when including the wildfire severity reduction interventions, natural and working lands can contribute reductions that are 2.5 times greater than those expected from the residential and commercial sectors combined, and 80 percent of both the industrial and agricultural emissions reductions modeled to meet the state’s 2050 targets.
 - Among the modeled activities, the largest reductions in net emissions came from avoided conversion on natural and agricultural land and changes to forest management on private timberland.
- Even with the limited scope of economic analysis included in this study, the economic benefits of land-use strategies are significant.
 - The modeled strategies produced between \$14.9 to \$17.2 billion in economic value by 2050 when accounting for the benefits of not emitting CO₂ or nitrogen-based greenhouse gases or pollutants, as well as avoided costs of damages from flooding and fire suppression.
 - The costs of these programs range from \$32.6 to \$35 billion from 2020 to 2050, respectively, including direct costs of program implementation as well as the opportunity costs of the foregone increase in land value in urban, managed forest, or agricultural land through 2050.
 - For every dollar spent on implementation and incurred as opportunity costs, \$0.49 is paid back under a “hot-dry” climate future and \$0.46 under the “average” model.
- These strategies are more attractive when considering the societal co-benefits.
 - The interventions modeled in the study provide co-benefits such as improved air quality, water quality and ecosystem resilience to climate change. These benefits were not translated into economic value, but many of the strategies modeled can help enhance quality of life across California, including protecting lives and property in the event of wildfires.
- Wildfire risk adds variability to the results.
 - The study modeled a strategy to reduce the carbon dioxide emissions of wildfires by thinning forests and conducting prescribed burning projects to reduce the overall areas burned in “high severity” fire events by over 1.5 million acres by the end of the century.



- This was modeled under two different fire scenarios, one in which 10 percent of land burned by wildfire fires is considered 'high-severity'—which is in line with historical measurements of California wildfires—and a 30 percent high-severity scenario, which is more representative of what has been seen in recent wildfires, in which up to 30 percent of areas burned by wildfires have high tree mortality.
- While both strategies to reduce wildfire severity produce increased emissions by 2050 due to the carbon dioxide emitted through prescribed burning and forest thinning, by the end of the century, these strategies could provide a net reduction in emissions by as much as 181 million metric tons of CO₂ and reduce the cost of fighting fires by up to \$240 million, depending on the climate future modeled.

As the California Air Resources Board prepares to discuss the state's emissions reduction goal for natural and working lands at a meeting this week, today's release provides some of the strongest data to date on the potential of land-use strategies to help meet California's climate goals. In a set of policy recommendations, the report authors urge the state to establish an ambitious emissions reduction goal for natural and working lands and note that early implementation is vital to reap the most impactful climate benefits.

"Because many of these strategies require a long lead time to achieve maximum benefits, California should consider fast-tracking implementation of land-based climate strategies immediately, especially if we're going to help stave off any decline in carbon stocks and grow the land's ability to store carbon," noted Michelle Passero, Climate Lead for The Nature Conservancy in California. "This will be a critical strategy if we're to meet California's carbon neutrality goal."

While the state has dedicated some funding from the Greenhouse Gas Reduction Fund (GGRF) for natural and working lands investments, the study authors urge California to dedicate meaningful and sustained funding to this sector, based on the significant climate benefits that can be realized.

"This study provides a glimpse into understanding how California can harness the power of land-based climate solutions to reduce emissions and combat climate change while building healthier ecosystems," said Perry. "And we hope this analysis will be useful outside of California as well, as states and nations across the globe seek to reduce emissions while increasing resiliency to climate change."

About Next 10

[Next 10](#) is an independent, nonpartisan, nonprofit organization that educates, engages and empowers Californians to improve the state's future. With a focus on the intersection of the economy, the environment, and quality of life, Next 10 employs research from leading experts on complex state issues and creates a portfolio of nonpartisan educational materials to foster a deeper understanding of the critical issues affecting our state.



About The Nature Conservancy

The Nature Conservancy is a global conservation organization dedicated to conserving the lands and waters on which all life depends. Guided by science, we create innovative, on-the-ground solutions to our world's toughest challenges so that nature and people can thrive together. We are tackling climate change, conserving lands, waters and oceans at unprecedented scale, and helping make cities more sustainable. Working in more than 65 countries, we use a collaborative approach that engages local communities, governments, the private sector, and other partners. To learn more, visit www.nature.org or follow [@nature_press](https://twitter.com/nature_press) on Twitter.

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