Stanford Woods Institute for the Environment

Research Brief

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Forests Contribute to California's Climate Change Goals

Background

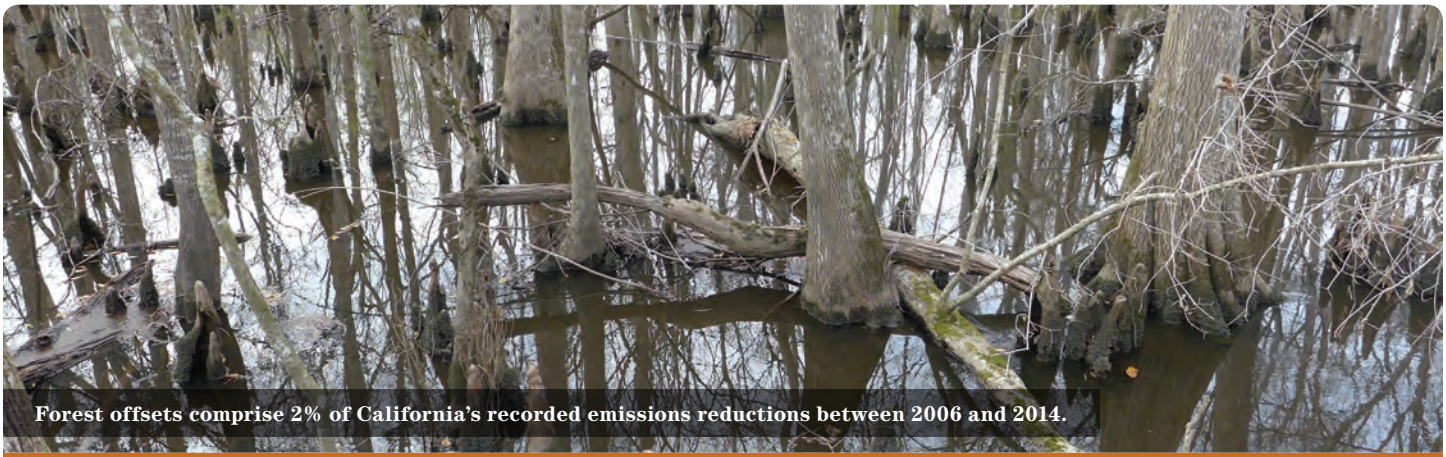
As one component of its policies to address climate change, California has developed a program to increase carbon storage through a forest offset program. Companies can buy offsets — each of which represents the storage or avoided emission of one metric ton of carbon dioxide — to meet some of their greenhouse gas emissions reductions requirements under the state's economy-wide climate change efforts. Most of these offsets are forest offsets.

Forest owners can earn forest offsets by "sequestering," or storing, carbon in trees, then selling the offsets represented by that carbon in California's cap-and-trade market. There are three options for increasing stored carbon. The first option is to grow new forest, thus restoring cover to previously forested land; this option not yet been used within the program. The second option is to conserve existing forest by avoiding its conversion to a different land cover—usually agriculture. The third option is to increase carbon stored in existing forests, by changing harvest levels, tree rotation cycles, or other forestry practices.

About the Researchers

This research was led by **Christa Anderson**, a PhD candidate in the Stanford's Emmett Interdisciplinary Program on Environment and Resources at the Stanford School of Earth, Energy & Environmental Sciences; in partnership with **Chris Field**, Perry L. McCarty Director of the Stanford Woods Institute for the Environment and Melvin and Joan Lane Professor for Interdisciplinary Environmental Studies; and **Katharine Mach**, senior research scientist in Stanford's Department of Earth System Science and Director of the Stanford Environment Assessment Facility.

We conducted research on all 39 forest offset projects that have been credited by the state. We answered two questions: 1) Are forest offsets providing real climate benefits? 2) Are forest offsets providing other benefits, such as supporting habitat for rare species or opportunities for recreation?



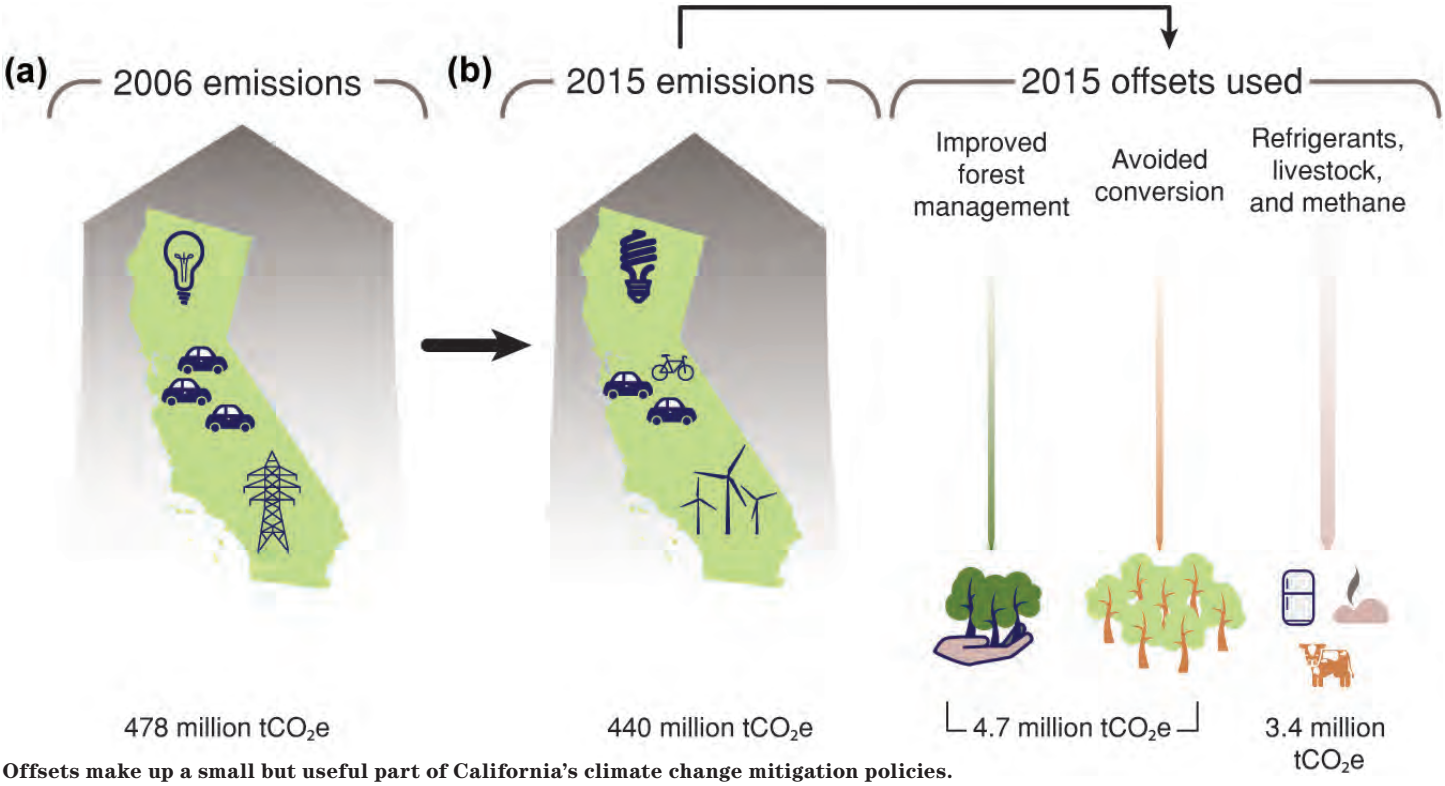
Forest offsets comprise 2% of California's recorded emissions reductions between 2006 and 2014.

Carbon impacts: modest, real and important

Using offsets in a program for reducing emissions always raises two prominent concerns: First, they can allow offset purchasers to avoid reducing their own emissions. Offsets potentially decrease the incentive for direct emissions reductions from industries, individuals, and sectors by outsourcing responsibility to offset providers. Second, offsets may credit emissions reductions that would have occurred even without the offset program.

California's forest offset program is limited to 8% of emissions allowances, but the actual volume of forest offsets used in the market to date has been 2%. At this low level, most of the emissions reductions are direct, and forest offsets are likely being applied selectively, in cases where direct emissions reductions are difficult or expensive. In this application, offsets do not act like indulgences, but if offset use increases to reach the 8% limit, their impact should be re-assessed.

To assess whether emissions reductions result directly from the forest offset program—i.e., whether they are 'additional 'to what emissions reductions might have been achieved in the absence of the project —we analyzed the metrics that California uses to make sure that projects produce emissions reductions. While there may be questions about some individual projects, the program as a whole shows evidence of providing 'additional' emissions reductions that wouldn't have occurred otherwise. On average, 20% of measured project credits are deducted or held in a state buffer pool, which operates as insurance in case of unintentional forest carbon loss due to fire or other unplanned causes. These measures help ensure that that credits entering the market are robust.



Offsets make up a small but useful part of California's climate change mitigation policies.

Figure from Anderson C.M., Field C.B., and Mach K.J. 2017. Forest offsets partner climate-change mitigation with conservation. *Front Ecol Environ.*


Participating forest offset project.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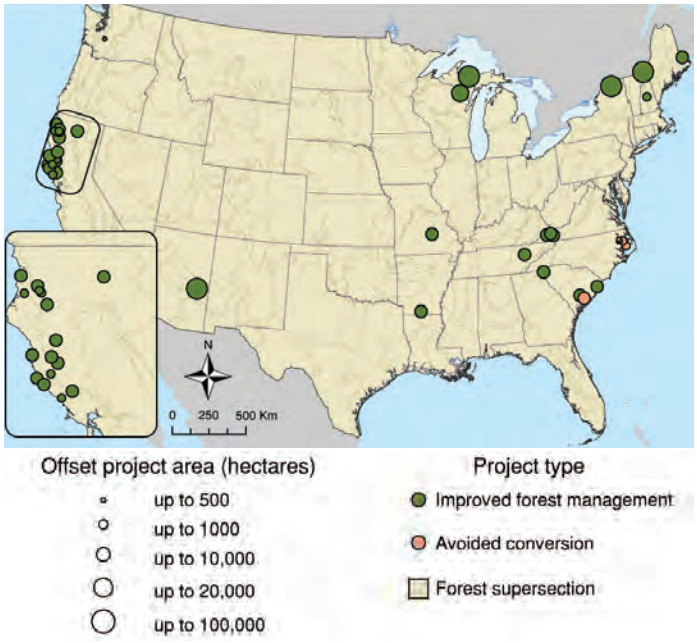
We also tested two of our own hypotheses. First, forest ownership may be indicative of an offset project's additionality. For example, conservation non-profits are less likely to log their forest for profit, and even without the program, their management practices may already sequester forest carbon. However, projects are held by diverse actors — private companies, timber investment companies, tribes, individuals, along with some non profits — pointing to overall program additionality.



Forest offset projects participate in the California cap-and-trade market but can be located anywhere in the contiguous US.

Figure from Anderson C.M., Field C.B., and Mach K.J. 2017. Forest offsets partner climate-change mitigation with conservation. *Front Ecol Environ.*

Second, active logging can be used to assess additionality achieved by improved forest management projects. That is, if landowners were actively logging at or prior to a project's inception, the program would be more likely to incentivize altered practices leading to additional forest carbon sequestration. Forest management projects joining the program mostly reflect active logging, again pointing to overall program additionality.

Co-benefits of forest offsets

If forest offset projects provide benefits beyond carbon sequestration, the additional benefits, called co-benefits, provide further motivation for the program. Co-benefits might be new opportunities for conservation, sustainable forest management, improved water quality, or recreation. All current offset projects are privately rather than publicly owned, and most participating forest owners (n=26; 66%) are timber companies or investment landowners, who do not traditionally seek strong conservation co-benefits.

We find significant non-climate co-benefits from forest offset projects. As a conservation example, 17 projects spanning 57,000 hectares contain habitat for endangered species, and improved forest management on forest surrounding these activity centers creates opportunities for additional endangered species protection.

Forest offset projects may be changing the traditional conservation paradigm by engaging landowners in generating co-benefits. Usually, conservation-oriented land owners have managed land primarily for conservation, and they have achieved sustainable forest management and carbon sequestration as co-benefits. In the California program, by contrast, land owners adjust land management for carbon and, in turn, achieve sustainable forest management and conservation as co-benefits.

Considerations for policy makers

The California forest offset program has some opportunities for improvement but also offers several lessons for forest offset programs under development elsewhere.

Opportunities for improvement

First, explicit, not just voluntary accounting of project co-benefits would enable more rigorous and holistic understanding of the gains from mitigation investments. At present, the program does not require reporting on co-benefits, but 'no cost' reporting opportunities could be taken up, such as consistently listing existing qualitative information about co-benefits.

Second, specifically including climate change risks in the forest offset protocol could increase the robustness of the program. Climate change will impact US forests, potentially limiting both carbon-storage potential and co-benefits, and these risks should be accounted for as much as possible.

Lessons for forest offset programs elsewhere

First, California's program requires 100 years of forest monitoring for forest offset projects, with the 100-year window starting after the last year in which a project receives credits. The 100-year time horizon provides confidence that the offsets credited are real emissions reductions over an extended duration.

Second, the most common forest offset project type, improved forest management, is structured such that projects can earn substantial credits in the first year of enrollment. This front-loaded credit approach for these most frequently enrolled projects may enable projects that would not otherwise be financially feasible.

Third, California's program establishes a method that combines rigor with inclusiveness. It embraces projects with multiple motivations while using appropriate risk discounting and feasibility testing. In the California program, the primary outcome measure is carbon, as it should be, but California does not exclude projects that also carry strong co-benefits. Unnecessarily strict criteria may limit participation, decreasing benefits from carbon sequestration as well as co-benefits.

Fourth, minimum carbon baselines in California's program are based on Forest Inventory and Analysis data, a long term forest census kept by the U.S. Forest Service. These widely respected data increase confidence in the program's climate benefits. Forest offset projects in other countries have struggled to establish similarly reliable and standardized baselines. To address this challenge in programs outside of the U.S., we recommend consideration of different levels of discounting for uncertainty.

Conclusion

Forest offsets can contribute to climate change mitigation, but they can also hinder it if they distract from necessary emissions reductions overall or decrease the feasibility of deep decarbonization. Our analysis shows that California's forest offsets account for a small percentage of emissions reductions, by design. Yet at the same time, they provide an important opportunity to supply meaningful carbon sequestration and multiple co-benefits. California's pioneering program demonstrates that forest-based offsets are feasible in a compliance market.

This brief is based on the paper "Forest offsets partner climate change mitigation with conservation" published in *Frontiers in Ecology and the Environment* [http://onlinelibrary.wiley.com/doi/10.1002/fee.1515/full].