Carbon offsets have wide-ranging environmental benefits

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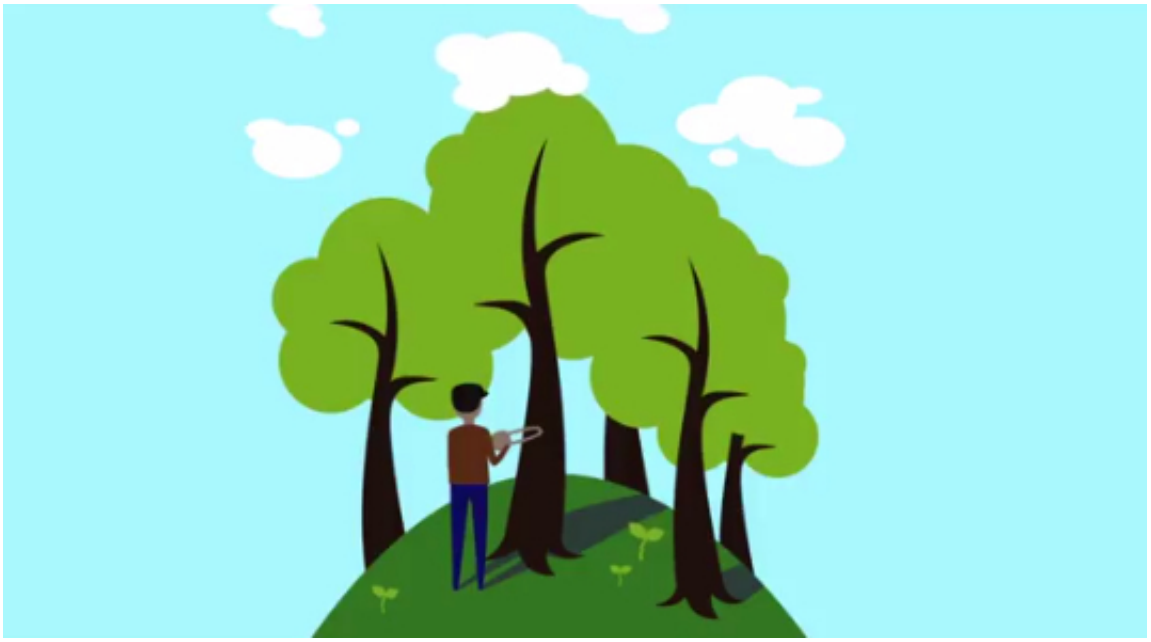

You can't grow money on trees, but you can earn money for letting trees grow. Or at least you can through a pioneering California program that allows forest owners around the United States to sell carbon credits to companies required by the state to reduce emissions. Researchers at Stanford analyzed the program and found that the initiative has valuable environmental benefits beyond just offsetting greenhouse gases.

"Many developing countries with large forests are interested in similar

programs to avoid deforestation," said lead author Christa Anderson, a graduate student in the Emmett Interdisciplinary Program in Environment and Resources at Stanford's School of Earth, Energy and Environmental Sciences. "California provides the first proof of concept with a government program that credits standing forests."

Storing more carbon

California law requires the state to reach 1990 levels of greenhouse gases by 2020, and 40 percent below 1990 levels by 2030. A cap and trade market – which includes power utilities, industrial facilities, transport fuels and natural gas suppliers – is a cornerstone of these efforts. In the market, polluters can buy offsets to meet some of their emission reduction requirements.

Forest offsets, which account for the majority of offsets in California's cap and trade market, involve forest owners changing the way they manage their land so trees will store more carbon. This could involve cutting trees less often, reforesting previously forested land or improving forests through various management practices. Under any scenario, professional foresters vet the changes to ensure they are effective.

For each additional ton of carbon dioxide their trees store, forest owners can earn a credit – worth about $10 currently – to sell to California companies required to reduce or offset their greenhouse gas emissions. Since it started in 2013, the program has earned forest owners about $250 million, while offsetting 25 million tons of carbon – an amount equal to 5 percent of California's annual passenger vehicle emissions.

Detractors say offset purchases allow polluters to avoid reducing emissions and may credit reductions that would have occurred without the program. While valid, the concerns have not been borne out, according to the paper published in *Frontiers in Ecology and the*

Environment.

Exhibit A for the program's effectiveness: The researchers point to the fact that most forest owners involved with the program are timber companies and investment land owners that had been logging their land previously. These landowners had to change their practices in order to participate in the program – further evidence of the offsets' impact.

Although California's cap and trade program allows the use of forest offsets up to an amount equaling 8 percent of a polluter's emissions, the volume issued so far is only 2 percent of total capped emissions. Because the pool of available offsets is quite small, polluters still need to reduce their own emissions directly, rather than relying on purchasing offsets. The program as a whole leads to emissions reductions that wouldn't have occurred otherwise, the Stanford scientists found after analyzing metrics used to confirm individual projects' robustness.

Still, Anderson and her co-authors warn against using forest offsets in large numbers because they may distract from urgent and drastic emissions reduction priorities elsewhere. One example: State legislators recently introduced a bill to convert California's energy sector to 100 percent renewable sources by 2045.

Lessons beyond California

The forest offsets approach may invert the standard paradigm in which conservation-oriented landowners manage land primarily for that purpose, and achieve sustainable forest management and carbon sequestration as co-benefits. In the California program, forest owners with a range of motivations adjust their land management to achieve greater carbon sequestration. In turn, they get sustainable forest management and conservation as co-benefits. For example, 17 of the 39 forest offset projects analyzed contain habitat for endangered species,

beneficiaries of management changes aimed at carbon sequestration.

"California is figuring out its cap and trade future," said co-author Katharine Mach, a senior research scientist in the School of Earth, Energy and Environmental Sciences. "Forest offsets have been a small but mighty portion of the state's climate action to date, which can inform where California goes next."

Carbon offset programs under development in Canada, China and elsewhere would do well to take a few cues from California's example, according to the Stanford researchers. Among them:

- A requirement for 100 years of monitoring offset projects after their last received credit provides confidence that the offsets credited are real emissions reductions over an extended duration.
- Most offset projects can earn substantial credits in their first year, which may enable projects otherwise financially unfeasible.
- By embracing projects with multiple motivations – rather than only those that prioritize carbon sequestration – California avoids limiting program participation and benefits.
- Because the program's minimum carbon baselines are based on widely respected U.S. Forest Service census data, confidence in its climate benefits is high.

In the meantime, the researchers suggest improving California's forest offset program by requiring participants to report a wider range of data on co-benefits and by taking into consideration climate change risks for the initiative.

More information: Christa M Anderson et al. Forest offsets partner climate-change mitigation with conservation, *Frontiers in Ecology and the Environment* (2017). DOI: 10.1002/fee.1515

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