More trees do not always create a cooler planet, geographer finds
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"We found that in some parts of the country like the Intermountain West, more forest actually leads to a hotter planet when we consider the full climate impacts from both carbon and albedo effects," said Professor Williams. It is important to consider the albedo effect of forests alongside their well-known carbon storage when aiming to cool the planet, he adds.

The research was funded by two grants from NASA's Carbon Monitoring System. Williams and his research team—comprising data scientist Huan Gu, Ph.D. from The Climate Corporation and Tong Jiao, Ph.D.—found that for approximately one quarter of the country, forest loss causes a persistent net cooling because the albedo effect outweighs the carbon effect. They also discovered that loss of forests east of the Mississippi River and in Pacific Coast states caused planetary warming, while forest loss in the Intermountain and Rocky Mountain West tended to lead to a net cooling.

According to Professor Williams, scientists have known for some time that expanding forest cover cannot be assumed to cool the planet or to mitigate global warming. However, this has not always been appreciated broadly.

"If we fail to consider both the carbon and the albedo effects, large-scale tree-planting initiatives, such as Canada's 2Billion Trees Initiative and The Nature Conservancy's Plant a Billion Trees campaign, could end up placing trees in locations that are counterproductive for cooling the climate system," said Professor Williams.

"It is all about putting the right trees in the right place," said Williams, "and studies like ours can help identify where the potential for cooling is greatest."

Every year, approximately one million acres of forest are being converted to non-forest areas across the lower 48 states of the U.S.; this is...

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Williams' research team used state-of-the-art satellite remote sensing to bring a detailed, observational perspective to examine this problem that had previously been assessed mostly with computer models. The three researchers pinpointed the locations of forest loss and identified what those sites became—urban, agricultural, grassland, shrubland, pasture, or something else. They then quantified how much forest biomass carbon was released to the atmosphere, and how much additional sunlight was reflected out to space. By comparing these two effects they measured the net impact of deforestation on the climate system.

The new datasets and methods used in Professor Williams' study show that the tools are available to take the albedo effect into account. The Clark team hopes to generate actionable datasets to share with land managers and policymakers worldwide within the next one or two years, to help ensure that their tree-planting efforts focus on the right places and have the intended effects.

More information: "Climate impacts of U.S. forest