



Why Silicon Valley is taking a big interest in trees

By **Ben Soltoff**

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SilviaTerra co-founders Max Nova, left, and Zack Parisa in the field.

From the set of investors in [Pachama's](#) \$4.1 million seed round, which closed earlier this year, you wouldn't think it's a company that specializes in analyzing forests.

The lead backer is Ryan Graves, a member of Uber's founding team, and other funders include a who's who of accomplished entrepreneurs and investors from across Silicon Valley. To list just a few: there's the founder of the famed Y Combinator accelerator; a co-founder of livestreaming platform Twitch; the head of an autonomous vehicle startup; and an early investor in tech giants such as Twitter, Instagram and Stripe.

So why are all these big names interested in forests? Trees aren't exactly a new technology. They haven't been "the next big thing" since they first spread across earth's landscape 360 million years ago.

The reason for Silicon Valley's interest is simple: carbon. Trees naturally capture and store carbon from the atmosphere, which helps to mitigate climate change. New technologies have unlocked opportunities for large-scale carbon removal through improved forest management, due to converging advances in satellite imagery, artificial intelligence and data analysis.



Breakthroughs in verification and valuation

Pachama takes full advantage of the technology boom that has occurred over the last several years. The San Francisco-based startup has a dual mission. First, it verifies and monitors carbon credits. The company uses satellite data to ensure that projects store as much carbon as they claim and then continue to store that carbon over time.

In addition to two-dimensional satellite images, Pachama also receives data from LiDAR (light detection and ranging), which is like radar but uses visible light waves instead of radio waves. The LiDAR shows not only where the trees are but also how tall they are. Together, satellite images and LiDAR give Pachama a three-dimensional, color picture of forests, without anyone ever setting foot on the ground.

Pachama gets much of its imagery from [Planet](#), a company that has dozens of small satellites in orbit collecting high-resolution images of the entire earth every day. "In general, there's been an explosion in the cost-effectiveness of remote sensing," said Tara O'Shea, director of forest programs at Planet. "We're getting more data and of higher quality."

But remote measurements can't do everything. To understand how much carbon is stored in a given plot, it's necessary to understand the age, species and size of the trees on that plot; that information has to be collected on the ground, at least initially. That's where artificial intelligence comes in.

Pachama's algorithm uses machine learning to take in a few data points, and then extrapolate how much carbon is stored in similar areas of a given shape and color in the 3-D picture. This type of system is called a neural network because it mimics the way that neurons comprehend information in a human brain. For North America, Pachama's network is able to predict the amount of carbon stored in a given area of forest with less than 2 percent error.

“ By measuring carbon and wildlife and giving buyers confidence that they can get what they paid for, we stand to unlock a lot of value in these forests. ”

Even when land managers are able to verify the carbon they store, they can't always find someone willing to pay for them to keep storing it. That's why the second part of Pachama's mission is to create a marketplace for buyers and sellers. Those buyers might be governments looking to comply with public policies such as the Paris Agreement or they might be private companies looking to offset their emissions.

One of Pachama's investors is Tobias Lutke, chief executive officer of Shopify, whose company has [committed](#) to buying \$1 million of sequestered carbon every year. That's a small amount, given that Shopify's operating expenses are well over \$1 billion, but it's meant to kickstart a still-nascent market. Shopify is one of several companies already buying credits on Pachama's platform.

"We started with technology companies because we knew that they were going to understand how our system works in terms of online purchasing and in terms of validating the claims of the project with AI and satellite images," said Diego Saez-Gil, founder of Pachama.

Another of Pachama's buyers, Microsoft, recently announced [an ambitious commitment](#) to not only become carbon neutral by 2030 but also to cancel out all of its historical emissions by 2050. To get there, it will need to find methods to economically remove large quantities of carbon dioxide from the atmosphere, and it has launched a \$1 billion carbon innovation fund to help make that happen.



Measuring and mapping a market

Even before making its carbon commitments, Microsoft was proactively putting its technological resources to use through its [AI for Earth](#) program, which provides cloud computing power and technical support to startups and research organizations that are applying artificial intelligence to environmental challenges.

For instance, Microsoft offered up its cloud computing platform and technical know-how to help startup [SilviaTerra](#) to create a "basemap" of every acre of forest in North America, including an estimate of the species and size of every single tree. SilviaTerra used machine learning to build the map, based on satellite and sensor data from sources such as NASA, trained with field measurements from the U.S. Forest Service.

"There's no Zillow for trees or there hasn't been until us," said Max Nova, a co-founder of SilviaTerra. "A lot of people are shocked that we don't really know what's on every acre. It seems a little crazy that we're in 2020 and that's still a mystery."

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SilviaTerra's basemap is more than just enlightening. It lays critical groundwork for landowners to participate in markets for carbon storage and other ecosystem benefits. Forest managers can easily cut down their trees and sell them at the local sawmill, but it's much harder to find a market for the services provided by keeping forests intact, particularly on small amounts of land.

"People get paid for timber right now," Nova said. "Very few people are getting paid for things like carbon and wildlife. By measuring those things and giving buyers confidence that they can get what they paid for, we stand to unlock a lot of value in these forests."

SilviaTerra is developing what it calls a "forest carbon rental market," where landowners can get paid for delaying the harvest for a given year, rather than the entire life of the forest. This method factors in an expected likelihood of harvest, to account for situations where a landowner would have kept the forest intact even without a payment. SilviaTerra's approach is part of a strategy of "dynamic conservation," with tailored and flexible decision-making, which is only possible due to the comprehensive and detailed information that it has collected in its base map.

"At the end of the day, having the data is nice but it's not enough," Nova said. "It only really matters if it's driving different decisions that people are making on the landscape."

The carbon credit conundrum

For Microsoft, supporting companies such as SilviaTerra and Pachama is a way to build a pipeline of projects that it can use to meet its long-term targets for becoming carbon negative. Although when I spoke with Bonnie Lei, head of global strategic partnerships at AI for Earth, she also identified a deeper existential imperative.

"If you're considering the future of how you do business ... the basic stability of how you're able to operate is going to be completely dependent on how good of a steward you are of your current environment," she said.

In spite of a few big commitments, investments in forest carbon storage have been relatively small, compared to the carbon that needs to be removed to limit warming to 2 degrees Celsius. Plus, forests can't do all the work on their own. Even planting 1 trillion trees isn't enough to seriously put the brakes on climate change without also drastically reducing emissions from fossil fuels. However, many emissions can't be stopped right away, which is why carbon credits are particularly crucial.

Diego Saez-Gil founded Pachama with the expectation that there eventually would be a large and thriving demand for carbon removal, and his roster of big tech investors seems to share that vision. "If the planet continues waking up to the reality of climate change and the urgency of action, we believe that carbon markets will continue to expand," he said.

This article has been updated to correct the name of Pachama's founder. It is Diego Saez-Gil, not Diego Sanchez-Gil.

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