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Biochar: One Way to Deal with More Fire-Prone Forests

By JESSICA LEBER, [ClimateWire](#)

Joseph Duda, forest management supervisor for the Colorado State Forest Service, is going to have a lot of wood on his hands. But a thousand-year-old technique used to make charcoal may keep him from being buried in it.

The new log-sorting facilities he manages are due to accept material from all over the state's Front Range, where landowners are facing a growing need to remove both the thinner trees and forest brush that spread wildfires and the pine trees infested by spreading beetle epidemics that are ravaging trees throughout the West.

Climate change is the link that makes Colorado's problem a vicious cycle -- rising temperatures could increase the risk of beetle infestations, according to studies. The dead trees, along with hotter and drier climate conditions, in turn, raise the risk and the potency of wildfires.

"The worst thing that can happen is that the temperature and the bark beetle together kill the forest, lightning strikes it and burns it down and puts every bit of carbon into the atmosphere," said Durwood Zaelke, president of the Institute for Governance and Sustainable Development. He cited studies that have shown that forests in Canada are already turning from a carbon emissions sink into a carbon source.

Managing lands to stop the spread of pests and fires depends on finding a use for all that wood. "We've got to do something," said Duda. "There's nowhere near enough public funds to go around and do all the treatment that's necessary."

Thick logs, sold as lumber, can yield a tidy sum. But the scrawny and diseased trees that come from forest treatments have few commercial uses -- a major problem, since thinning an acre of land can cost as much as \$2,000, according to Duda.

Many private landowners and public agencies resort to burning the waste wood, which also sends CO₂ emissions up to the atmosphere, albeit in a controlled way. Other projects have worked to chip the wood and use it primarily as a source of electric energy or heat.

Duda, instead, has partnered with a Colorado-based company, Biochar Engineering Corp., on a pilot experiment that has the potential to instead keep more carbon on the ground, fertilize soils, and earn back money at the same time.

Reducing emissions by creating pure carbon

Soon, the company will install the mobile trailer-sized unit it is developing, which uses a process called pyrolysis -- burning wood, animal wastes or other organic materials in the absence of oxygen -- to make biochar, a particular form of charcoal.

Producing biochar is an ancient technique that Amazon peoples deployed thousands of years ago to manage their agricultural wastes and perhaps enrich their soils, according to research by Johannes Lehmann, a soil scientist at Cornell University.

Now biochar being seen as a solution among advocates of mitigating climate change, who promote it as a triple threat that can store carbon while at the same time improving soil fertility and producing energy, to boot.

The char -- essentially pure carbon -- can remain inert in the soil for up to 2,000 years, said Debbie Reed, policy director of the International Biochar Initiative, which is advocating for both U.S. and global support for biochar projects.

Already, however, there are those wary that incentives could spur a biochar "industry" that, instead of solely utilizing waste products, degrades lands or accelerates logging while banking carbon credits.

And while the technology is old and known, deploying it at larger scales is still at the exploratory stage. "The question is whether it would scale to any significant level that it would make a big difference for climate change," said Lehmann.

Potential for plenty of product, but where's the market?

Projects in the United States, Canada and Australia have focused on commercializing larger plants that accept waste biomass and convert it to energy and biochar.

Biochar Engineering's approach, however, is to bring the process down to the scale at which it could be used more affordably, in a forest or on a farm, reducing the costs of transporting the raw material to a bigger facility.

Jim Fournier, president of the company, said workers would feed waste wood into the system and use the char to help regenerate forest soils and store carbon. With some technological advances, he said, the process could also churn out liquid fuels such as methanol.

But at a cost of several hundred thousand dollars, the economics are less than certain, and more research is needed to optimize the process and understand the ecosystem impacts, said Fournier.

One key is finding a market for biochar. Today, farmers will pay to use it as a soil amendment, which is largely what drives development of the technology today. Researchers in the U.S. Interior and Agriculture departments are also exploring it as a material that could filter heavy metals at contaminated sites.

But in the forestry sector, the prospects for biochar are likely tied to projects that are already funded for wildfire management, said Fournier. A price on carbon, which would reward the stored carbon, would also be a huge boost, he said.

"If this is feasible," said Duda, "it would allow us to manage a greater portion of forested lands that right now aren't cost effective." Ultimately, he said, to manage forests on the scale that's necessary, they will need to pay for themselves.

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