

| Perpetual Planet |

Drones Spray Tree Seeds From the Sky to Fight Deforestation

These innovators are combating climate change and restoring forests with the latest technology.

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Every year, about 15 billion trees are cut down to make way for agriculture, mining, logging, and urban sprawl. Such mass deforestation has accelerated global warming and imperiled the survival of millions of species. Though many nations, organizations, and even individuals have tried, no one has been able to plant enough trees to make up for that loss—but some innovative entrepreneurs are working on a high-tech solution.

BioCarbon Engineering (BCE), a U.K.-based start-up, has developed a technique that they say could potentially plant one billion trees per day. The method? Drones.

Current tree-planting programs "are just not fast enough," said Irina Fedorenko, a co-founder of the company. "But our technology is automated,

[Teenager who is on track to plant a trillion trees.](#)

Trees are critical to absorbing the greenhouse gases that contribute to global warming. Without them, the speed and severity of climate change will continue to escalate. But for their part, BCE has dubbed their strategy “industrial-scale reforestation.”

First, a drone scans the terrain and develops a 3-D map of the area. Then, using the data from this “smart map,” the team develops an algorithm for a unique planting pattern. A “firing drone” uses the algorithm to carry out the planting strategy. The drone flies about six feet above the ground, firing germinated seed pods at a speed that will get them under the soil. One drone operator can manage six drones.

It’s similar to strategies used for precision farming, except in this case, the firing drones take the place of tractors—“sky tractors,” as Fedorenko refers to them.

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technique is much more efficient and methods. Initial testing in the U.K. found better survival rate than helicopter

“We are bridging this gap between ground-based technologies like tractors and aerial technologies such as helicopters,” Fedorenko says.

Speed is the most revolutionary aspect of BCE’s “precision planting” technology, but the drones can also reach places that tractors and humans cannot, at least without significant bodily risk—for example, steep mountainsides or areas with contaminated soil. Drones may even one day help terraform other planets.

But it’s not just about trees: “We have a title of tree-planting drone company, but we also do grasses, bushes, flowers, and a lot of fungi,” Fedorenko says. “It’s about restoring what is right for the environment, not just trees.”

Pioneer plant species are usually the most successful, “but the general rule is that if you can restore the forest from seeds, then you can use drones to do that,” Fedorenko says.

In June, BioCarbon planted 5,000 trees in a day to rehabilitate land ravaged by coal mining in Dungog, Australia. They’ve also worked in South Africa and New Zealand. Since the company’s inception, they’ve used drones to plant more than 25,000 trees across the globe.

“If you re-forest a large area of land, you bring back not just fertile soil, but you can really impact local climate, improve the water table, carbon sequestration, increase biodiversity, and, of course, landscapes are never empty so you always have people who are benefiting from the ecosystem,” Fedorenko says.

THE BIG PICTURE

protection from factors such as overgrazing, agriculture, and fires, to allow natural regeneration of forests to occur. Some experts worry that the efficiency of drone reforestation could even lower motivation for countries to save existing forests. Additionally, in traditional reforestation enterprises, the planting work can provide employment for communities that need it—jobs that could one day be replaced by drones.

"It's probably easier, in the short term, to plant trees with a drone than fix the issues on the ground, but in the long run, that fix is necessary," says Richard Houghton, a senior scientist at the Woods Hole Research Center, a climate change think tank based in Massachusetts. "A technical fix is generally easier than social change, but not as long lasting."

With constantly improving GPS and imaging technologies, experts agree that drones have become very useful for accurately mapping large swaths of land and measuring tree and vegetation growth or degradation—even mapping carbon sequestration. But some scientists are more skeptical about their success as a planting technology to combat deforestation on a large scale. For one thing, they only have so much range and battery life.

"Drones are good for measuring secondary growth and looking at where the forest is coming back, but you fight deforestation at a socioeconomic level," says Arturo Sanchez, director of the University of Alberta's Center for Earth Observation and Sciences. "The issue of climate change is not forest restoration, the issue is energy. It is controlling coal plants, power plants, automobile emissions. Planting trees is very important, but when you look at the distribution of CO₂ emissions, deforestation accounts for 10 to 15 percent. The rest is energy. That's what needs to be controlled."

causes or impacts of deforestation, but she says they could become a useful tool. ([See how drones set controlled burns by shooting fireballs.](#))

FIELD TESTS

BCE just started work on a large-scale project to plant mangroves in Myanmar, incorporating this integrated approach to ecosystem restoration. Mangroves in Myanmar’s low-lying Ayeyarwady Delta have been decimated by years of deforestation for agriculture and aquaculture—eighty-four percent of the original mangrove cover is gone.

“Mangroves have huge potential to actually save people’s lives because they protect coastal communities from tsunamis,” Fedorenko says. “Not only do they have an impact on the ecosystem, like fish stocks, so that people can maintain their livelihoods, but they are also a literal shield from the ocean.”

Their tangled roots also protect coastal areas from erosion.

The project spans more than 600 acres and involves a “holistic” approach to measuring success: BCE will be partnering with local women farmers, training and employing them to collect and prepare the seeds, as well as monitor the ecosystem as the project progresses. BCE will be able to assess whether the mangroves are growing successfully in less than a year.

Mangrove forests are also some of the most carbon-rich habitats on the planet, sequestering carbon up to 100 times faster than terrestrial forests. That means they’re incredibly efficient at mitigating the impact of global warming.

The project is one step closer to BCE’s main goal: “Of course, our ultimate ambition is to stop climate change,” Fedorenko says with a smile.

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