This disease has killed a million trees in California, and scientists say it’s basically unstoppable

Why millions of California trees are dying

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A fungal pathogen is causing an epidemic of "sudden oak death" in California. Researchers studying the invasive disease say its continued spread is inevitable. (Jenny Starrs/The Washington Post)
Healthy forests are especially important at a time of climate change — they’re an incredible tool to remove carbon dioxide from the atmosphere. Dead forests, on the other hand, can light the spark for wildfires, which are already showing a long-predicted uptick in activity.

In California’s coastal forests, health is anything but good. Since 1995, a pathogen that causes a phenomenon dubbed ‘sudden oak death’ (a far catchier name than that of the pathogen itself, Phytophthora ramorum) has taken out millions of oak and tanoak trees, particularly along the coast extending northward from Monterey County. That includes areas of Marin County, Sonoma County and Big Sur.

The pathogen is a water mold that affects different trees differently, and not all are susceptible. It will tear through a forest and kill some trees while leaving others standing.

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But in some trees, the pathogen causes tree trunks to crack open a ‘canker’ and literally bleed out sap. The disease is actually related to the pathogen that caused the Irish potato famine in the 1800s.

“Millions of acres of land have been affected in coastal California,” says Richard Cobb, a postdoc at the University of California, Davis, who studies the disease. “It spreads via wind and rain, and it’s made some really big jumps to different parts of the state and into Oregon. It probably spread into California via the nursery trade. And it has been moved around the country a lot, also within the nursery trade.”

Unfortunately, new research on this invasive disease, published in the Proceedings of the National Academy of Sciences Monday by Cobb and a group of colleagues, finds that while there may once have been a chance to stop the spread of sudden oak death — around the year 2002 — that opportunity has since passed. Forces didn’t mobilize fast enough or spend enough money, and the disease model employed in the new research (a model not so dissimilar from those used to study how various diseases can spread among humans) suggests continual spread of the disease.
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HANDOUT PHOTO: Lesions on a Shepherd’s Crook Tanoak twig. Symptomatic California bay laurel leaves generally precede oak and tanoak (pictured) infections, and are often the first sign that Sudden Oak Death is in a location. This is on the North coast of California, where disease is still fairly active as they really haven’t suffered much from drought. Sudden Oak Death is a tree disease caused by the plant pathogen *Phytophthora ramorum*. (Photo by Brendan Twieg, UCCE Humboldt and Del Norte Counties)

“Slowing the spread of *P. ramorum* is now not possible, and has been impossible for a number of years,” the study states bluntly. The research was led by Nik Cunniffe of the University of Cambridge, in collaboration with researchers from the University of California, Davis and North Carolina State University.

To stop sudden oak death, you have to go in and remove infected trees across a large area. And there’s so much pathogen mass now in California forests that the model finds that it will just spread, and spread. As pathogen biomass increases, says Cobb, “the rates of spread accelerate, and so does cost.”

More specifically, the study found that unchecked, sudden oak death will grow to affect close to ten times the current area — from around 1,550 square kilometers today to 14,000 square kilometers by 2030. But it also found that an attempt to manage the problem by removing infected trees over 200 square
kilometers annually, at a cost of $100 million, would make little dent in this spread.

Simply put, the disease is now in a “phase 3” epidemiological state, the study says, in which “the pathogen has spread far enough that eradication is no longer possible; local containment may still be an option.”

“Our analyses show that statewide action to eradicate or even slow the spread of [the pathogen] is no longer feasible, even with a substantial budget, indicating that the epidemic in CA is now firmly in phase 3,” the study continues.

Granted, it’s not like stopping the disease in 2002 would have been easy. “It would have taken unprecedented cooperation, and an unprecedented amount of funding,” says Cobb. “This would have been extremely difficult and there would be some tough questions about whether it would be worth, even then, such a huge investment.” He suggests the cost could have been $60 million per year, for many years.

Instead, though, California must now live with the impacts of the disease. They include forest areas filled with dead trees that are a fire risk — and a risk not only of burning themselves, but also carrying fire to other trees that are still living and did not get infected with the pathogen, Cobb says.

The disease also threatens forest carbon sequestration in the state — and thus could undermine California’s ambitious climate goals. It most severely damages tanoak — an evergreen tree with “flowers like the chestnut and acorns like the oak,” according to the U.S. Forest Service — that plays many key ecological, economic and cultural roles.

“Many wildlife species cache tanoak acorns for later consumption, including acorn woodpeckers (Melanerpes formicivorus), Stellar’s jays (Cyanocitta stelleri) and at least four species of squirrels,” notes a recent study of the consequences of such severe damages to tanoaks in California. Tanoak acorns are also a traditional food source for Native American communities in California.

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Cobb emphasizes that just because the disease cannot be eradicated or stopped does not mean that it should not be managed or contained, because forest managers and state agencies can still make a difference in key areas.

More generally, the sweeping disease underscores just how disruptive and unpredictable invasive species threats can be — from the mosquitoes that carry Zika to plant pathogens — at a time of unprecedented global trade and travel, combined with climate change.
“It was known as this minor pathogen of Rhododendron in the Netherlands prior to arrival in California,” says Cobb. “Given the state of knowledge about the thing, there is nothing where you would have said, ‘oh, this is going to be a problem in California oak forests.’ We’re constantly caught off guard by these things, they seem to frequently behave in ways that we don’t anticipate.”

Correction: This article previously referred to the pathogen that causes sudden oak death, Phytophthora ramorum, as a fungus. While it could be described as resembling a fungus, the pathogen is actually a water mold, or oomycete. Read more at Energy & Environment: