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Invasive Insects and Diseases Are Killing Our Forests

Gabriel Popkin | February 06, 2021

It's not just humans. Trees also suffer plagues.

In the past 120 years, voracious insects and fungi have swept across North America with frightening regularity, laying low the chestnut, the elm, the hemlock and, most recently, the ash. Each of those trees anchored natural ecosystems, and human economies and cultures. And while climate change and wildfires grab the headlines, invasive species have so far proved to be a far greater threat to forest biodiversity in the temperate world.

These plagues have also amplified climate change. Research has found that rotting trees killed in the United States by forest pests release carbon dioxide into the atmosphere at a rate within the same order of magnitude as wildfires.

Much as we were unprepared for the virus that has killed more than 450,000 people in the United States and 2.2 million worldwide, we're not ready for the next tree pandemic either.

Tree plagues differ from human ones in a few important ways. On the plus side (from a tree's perspective), insects and diseases are often specific to a genus, so no plague can hit every tree at once. On the minus side, as Gary Lovett of the Cary Institute of Ecosystem Studies points out, people can stay indoors and get immunized, but trees "have to stand there and take it."

In many ways, however, tree plagues are surprisingly similar to human ones — and these similarities can help us manage both types of threats.

Human and tree plagues move around the globe via travel and trade. Columbus and other European explorers brought smallpox, measles and other viruses to the New World starting in the 15th century, and viruses have been leaping oceans ever since. Columbus's arrival also set in motion an often cataclysmic biological reunification of Asian, European and American flora. People crossing oceans brought not only new pathogens, but also new plants — and their retinues of insects and microbes.

In the millions of years since the continents separated from what had been larger land masses, trees like chestnut and ash had diverged into distinct species that provided sustenance to specialized communities of insects and microorganisms. Trees evolved defensive chemicals — a sort of tree immune system — to keep all this feeding at manageable levels. That's why, for

example, white oak trees can sustain more than 500 caterpillar species while retaining enough leaves to feed themselves.

The trans-ocean movement of tree species upended things. Occasionally, a pest landed on a tree similar enough to its host tree to be digestible, yet dissimilar enough to lack defenses against the pest. In the early 1950s, for example, woolly adelgids from Japan were discovered in the United States. The tiny insects found the sap of Eastern hemlocks delicious and began to multiply, decimating hemlock trees. By the time the problem raised alarms in the 1970s, the outbreak could not be contained. It may be thousands of years before the hemlock regains the abundance it had a mere five decades ago.