What the World Will Lose if Ancient Trees Die Out

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Rachel Sussman

By Jared Farmer

Dr. Farmer is a professor of history at the University of Pennsylvania and the author of "Elderflora: A Modern History of Ancient Trees."

Old trees are in big trouble.

Whole forests with fire-resistant giant sequoias up to 3,000 years in age have recently gone up in flames. Whole stands of drought-resistant Great Basin bristlecone pine, a species that can reach 5,000 years in age, have been sucked dry by bark beetles. Monumental baobabs, the longest-living flowering plants, buckle under the stress of drought in southern Africa. The iconic cedars of Mount Lebanon, ancient symbols of longevity, struggle in warmer, drier conditions. Millennial kauris in New Zealand and centenarian olive trees in Italy succumb to invasive diseases.

Cumulatively, this is more than a cyclical turnover. This is a great diminution: fewer megaflora (massive trees), fewer elderflora (ancient trees), fewer old-growth forests, fewer ancient species, fewer species overall.

Although Earth's "tree cover" — three trillion plants covering roughly 30 percent of all land — has expanded of late, the canopy increasingly consists of trees planted for timber, paper pulp and cooking oil and for services such as protecting soil from wind erosion and offsetting carbon emissions. It's young stuff. Old-growth communities are scarce and getting scarcer.

Ancient trees provide services too, but really, they are gift givers. Of all their gifts, the greatest are temporal and ethical. They inspire long-term thinking and encourage us to be sapient. They engage our deepest faculties: to revere, analyze and meditate. If we can recognize how they call upon our ethical imperative to care for them, then we should slow down climate change now, and pay forward to people who will need a future planet with chronodiversity as well as biodiversity.

Old trees are necessary for sustaining the rich communities of species in forests. They drop seeds and litter eaten and used by animals on the ground; up high, they host epiphytes and birds. In the ecologist Meg Lowman's formulation, there's a lively "eighth continent" in the canopy.

The ecosystem underground might as well be the ninth. Trees share nutrients through mycorrhizae, the symbiotic association between fungi and plants at the root level. Preliminary research on these networks, called the "Wood-Wide Web," demonstrates that big old trees have outsize importance, serving as hubs for hundreds of other trees.

These hubs redistribute the life-giving nutrients of nitrogen and carbon — first to their own kind, secondarily to out-of-kin plants, sometimes even to competitor plants. For a seedling, the assistance of a big old tree may mean the difference between death and a long, long life. Suzanne Simard at the University of British Columbia, a leading ecologist in this field, refers to well-connected givers as "mother trees." The destruction of old growth destroys not just standing trees but also the underground links among them.

Each ancient tree is also a precious genetic repository. According to models, one-quarter of the trees in an old-growth forest will be triple or quadruple the median age, and one-one-hundredth will be 10 or 20 times the median age. Each plant in the latter group arose at a specific moment in the past when favorable conditions allowed for their establishment — conditions that may not recur for centuries. As bridges between pasts and possible futures, these plants contribute genetic resilience to the population.

The eldest are irreplaceable for science, too. Only about 25 plant species can, without human assistance, live beyond one millennium, and they are mainly conifers of primeval lineage. Their genetic code — the product of hundreds of millions of years of evolution — contains information scientists

have barely begun to analyze. As the technology of genetic sequencing advances, people may find new applications for the DNA of thousand-year-old trees.

Certain millennial conifers such as bristlecone pines have distinct utility. Their tree rings are living data — proxies for temperatures, winter snows, summer droughts and supervolcanic eruptions. Dendrochronologists use them to reconstruct past climates and model future ones. As climate recorders, tree rings are comparable to ice layers, only more sensitive.

On a purely utilitarian level, populations of ancient trees temporarily absorb some of the excess carbon in the atmosphere. The slower that big old trees grow, the higher their potential for negative emissions; the longer they delay death and decomposition, the longer they can sequester greenhouse gases inside their wood.

For this reason, some organizations and corporations scrambling to offset their emissions have single-mindedly pursued tree planting. But these initiatives have a spotty record. Protecting existing old-growth should take priority over generating new tree cover.

The stakes and the scale of forest stewardship have changed in the climate crisis. Large-scale preservation of habitat is no longer enough; it must be paired with rapid decarbonization of the economy. Otherwise, the future for old growth is ashes.

Can we care enough in time? History suggests we can. Tales of sacred plants — and their keepers and desecraters — are among the oldest living stories, from Gilgamesh in the Cedar Forest to the Buddha beneath the Bodhi tree.

Around the globe, at shrines and temples and churchyards, locals give

protection to trees planted centuries ago — or just recently — the latest in a long, unbroken sequence of consecrated plantings. Sacred groves are traditional features of many cultures and religions. And state-protected areas with big old trees — secular sacred groves — can be found from Alishan National Forest Recreation Area in Taiwan to Waipoua Forest in New Zealand to Alerce Costero National Park in Chile.

Among plants, there are ephemerals, annuals, biennials, perennials — and beyond them all a category I call “perdurables.” Perdurance is resilience over time. Humans can recultivate this attribute by caring for old trees and the old-to-be. Sustaining long-term relationships with long-lived plants is a rejection of The End, an affirmation that there will be — must be — tomorrow. That is a gift.