

# Qualia

## Worldwide decline in large, old trees alarms scientists

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Old Tjikko in Fulufjäll, Sweden, is considered one of the oldest trees on Earth. The age of its roots is estimated to be 9,550 years old, based on carbon dating, however individual stems, like the one shown, generally only live for 600 years. (Image: Karl Brodowsky, Wikipedia Commons)

Large, old trees play a critical role in many environments, from forests and savannas to human-dominated areas like cities and farm lands. But a [new study in the journal \*Science\*](#) documents an alarming decline among trees 100-300 years old in ecosystems around the world. I spoke with one of the study's authors, [AAAS Member and Washington University professor of ecosystem analysis Jerry Franklin](#), about why this trend is so disturbing and what can be done to save these ancient giants.

**AAAS MemberCentral: What is causing the decline of these large, old trees?**

**Jerry Franklin, AAAS Member and professor at Washington University:** The problem is the intentional removal of these trees as a part of human management of the sites where they are present. Also problematic is the absence of societal policies that recognize the importance of such trees to ecosystem function and biodiversity and make retention and restoration of

populations of such trees a part of governmental forest policies. For example, in North America we have no formal federal or state forest policies that recognize the need and intent for retaining and restoring large old trees as an element of our managed forests. The decline in old trees seems to be driven by a combination of factors, including land clearing, agricultural practices, controlled fires by humans and wildfires, logging and timber, and climate change.

**AAAS MC: Where did you see significant decline of these trees?**

**Franklin:** The major problem is the intentional or accidental removal of such trees and the lack of forest policies to provide for such structures through management. Studying records around the world, we found a decline in old trees in forests, woodlands, savannahs, rural areas and even in cities. It is a worldwide problem, occurring at all latitudes, in places such as California's Yosemite National Park, the Brazilian Amazon, the temperate forests of Europe, the African savannahs and the boreal forests of the far north.

**AAAS MC: Why are larger, older trees at risk? Do you know why the decline is affecting these trees in particular?**

**Franklin:** Major reasons include the value of these trees and the focus of traditional forest management on growing and harvesting crops of young trees. One problem has been that traditional forestry practices and policy have never recognized old trees as having any special importance and, in fact, have targeted the removal of such trees because of their high value and the desire to replace them with rapidly growing young trees.

**AAAS MC: Why are old trees so ecologically important?**

**Franklin:** Old trees are not simply enlarged versions of young trees! Old trees develop a number of unique attributes over the centuries that distinguish them from younger trees and, among other things, provide numerous niches for other elements of biodiversity. These include: distinctive crowns with large branches and multiple crowns; cavities, broken tops, decay pockets, and other features that are the result of mechanical injuries and attacks by insects, pathogens, and parasitic plants; often thick injury-resistant bark (especially important where wildfire is frequent); other distinctive bark features (e.g., bark streamers on old eucalyptus trees); and higher (often much higher) proportions of heartwood, which is typically much more resistant to decay than sapwood, and therefore result in much more persistent large dead tree structures. Large old trees also have more distinctive and different effects on nutrient cycles and soil organic matter than small and young trees. They provide nesting or sheltering cavities for many animals and supply them with food in the form of fruits, flowers, foliage and nectar. Big trees store large amounts of carbon, and they play a critical role in recycling soil nutrients and influencing the flow of water within landscapes. For all of these reasons, large old trees provide many more niches for biodiversity as exemplified by the cavities. Old trees also represent major reservoirs of genetic diversity.

**AAAS MC: What are the next steps your team or other researchers can take to help stem the death rate?**

**Franklin:** We are calling for a world-wide investigation to assess big tree decline and identify areas where the decline can be stemmed. We need to encourage forest policies that recognize the importance of old trees in forest ecosystem functioning and which systematically retain existing old trees and restore and sustain old tree populations in perpetuity. Without changes in policy and strategies for improved management, large old trees are at risk of declining and even

disappearing in many ecosystems, which would gravely impact ecosystem integrity and biodiversity.

## **Related Links:**

- [Global Decline in Large Old Trees in \*Science\*](#)
- [Societal challenges in understanding and responding to regime shifts in forest landscapes in \*Proceedings of the National Academy of Sciences\*](#)