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Forests worldwide are getting younger, scientists warn

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The planet has been losing much of its forest cover, especially in tropical areas. Over the past three decades some 420 million hectares of forest has been lost worldwide through deforestation, according to the Food and Agriculture Organization of the United Nations.

In the past five years the global deforestation rate has declined somewhat with 10 million hectares lost annually, as opposed to the 12 million hectares lost each year between 2010 and 2015.

While deforestation rates have slowed in some regions such as parts of Asia, however, they have remained particularly high in Africa and South America. “The rate of net forest loss has increased in Africa in each of the three decades since 1990,” the FAO notes. “Annually South America had a net forest loss of 2.6 million ha in 2010–2020.”

Yet the problem isn’t just that many forests are being lost at unsustainable rates. It is also that many of those forests that remain are getting younger. Manmade environmental changes are resulting in shorter and younger trees, which is having a variety of impacts on global ecosystems, scientists say.

A primary reason for that, say researchers at the Department of Energy’s Pacific Northwest National Laboratory in the United States, is that rising temperatures and growing levels of atmospheric CO2 have been altering the world’s forests through a process called carbon dioxide fertilization. Over the past decades, the age of most forests has declined dramatically, they explain in a study published in the journal *Science.*

While higher levels of carbon dioxide in the atmosphere can increase tree growth and seed production, increased carbon dioxide fertilization often benefits younger forests that have

access to plenty of nutrients and water. On the other hand, forests that lack adequate nutrients and water can lose out because rising air temperatures impair older trees' ability to photosynthesize effectively. That can result in lower growth, higher mortality and reduced regeneration in trees.

And as the planet keeps on warming, forests are bound to keep getting younger with sturdy old plants replaced with younger ones. The old-growth forests of old will increasingly become memories of the past as larger trees die off and younger ones take their place.

"Forest dynamics are changing because of anthropogenic-driven exacerbation of chronic drivers, such as rising temperature and CO2, and increasing transient disturbances, including wildfire, drought, windthrow, biotic attack, and land-use change," the scientists write. "These antagonistic processes are co-occurring globally, leaving the fate of future forests uncertain."

This is bad news, explains Nate McDowell, an Earth scientist at PNNL who was the study's lead author. "A future planet with fewer large, old forests will be very different than what we have grown accustomed to," he says. "Older forests often host much higher biodiversity than young forests and they store more carbon than young forests."

McDowell and his team combined the survey of satellite imagery of forests worldwide with a detailed review of the scientific literature, which led them to conclude that on average tree size has declined over the last century worldwide.

"Mortality is rising in most areas, while recruitment and growth are variable over time, leading to a net decline in the stature of forests," McDowell explains. "Unfortunately, mortality drivers like rising temperature and disturbances such as wildfire and insect outbreaks are on the rise and are expected to continue increasing in frequency and severity over the next century. So, reductions in average forest age and height are already happening and they're likely to continue to happen."

More frequent and prolonged droughts, as a result of climate change, will pose further threats to many forests, as will wildfires that decimate entire forests. Logging, too, takes its toll on the age of forests as larger and older trees are felled only to be replaced by smaller newly planted trees. The cumulative impacts will have wide-ranging impacts for ecosystems globally, the scientists say.

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