

# The world is losing its big old trees

20 August 2020

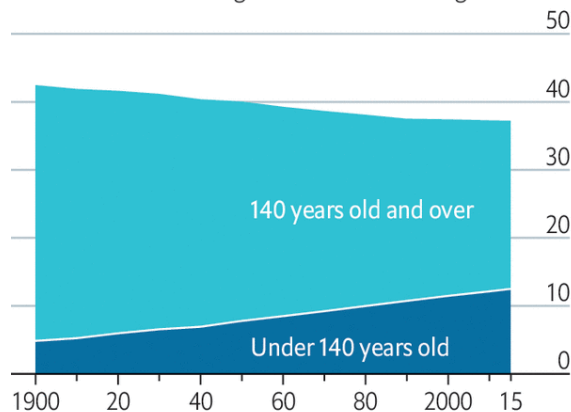
Even if some new forests are growing, the remaining canopies are becoming shorter—and so less able to absorb carbon

## Seeing the forest for the trees

World forests

### Forest area by age, m km<sup>2</sup>

Effect of land-use change and wood harvesting

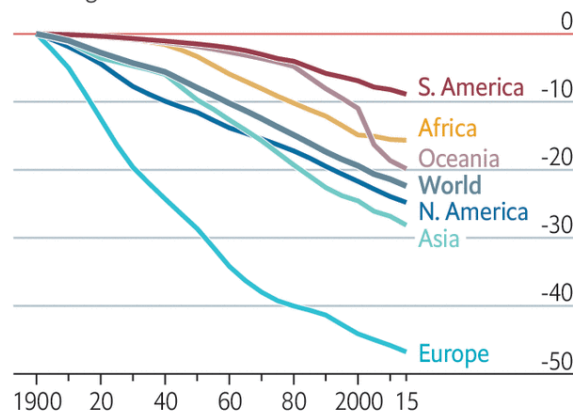


Source: "Pervasive shifts in forest dynamics in a changing world" by McDowell et al., 2020

The Economist

### Average forest age by region

% change since 1900



ON AUGUST 6TH 1964 an eager researcher sank a chainsaw into a gnarly Great Basin bristlecone pine on Wheeler Peak, a mountain in Nevada. A group of rangers helped him cut and section the ancient trunk. Only later, when the young dendrochronologist had counted almost 5,000 years' worth of growth rings, did he realise that he had unwittingly deprived the world of its oldest known tree.

Since then humans have been killing off the planet's old trees much more prosaically. A recent [study](#), published in *Science*, finds that the world has lost over one-third of its primary forests (defined by the researchers as those undisturbed by humans for more than 140 years) between 1990 and 2015 to land-use change (eg, to create farms) and tree harvesting for wood. At the same time the area of younger forests has almost tripled (see left-hand chart).

A team of more than 20 scientists analysed satellite imagery and 160 past studies to assess the dynamics of the world's forests (ie, the factors affecting their death and regeneration). They found that remaining forests, even if they are not deliberately destroyed, are under stress from rising temperatures and carbon dioxide concentration. This has led to a dramatic drop in their average age, and as a result a reduction in their height.

Ancient woodlands are the arboreal sentinels of their ecosystems. They harbour more species than newer forests, so preserve biodiversity. They are also the largest stores of

carbon on land, thereby helping to mitigate global warming. The loss of primary forest in 2019 was associated with 1.8 gigatonnes of carbon-dioxide emissions, equivalent to that produced annually by 400m cars, according to Global Forest Watch, a monitoring service. As ancient trees die and decompose, heaps of stored carbon are released into the atmosphere. The vicious cycle begets more warming. Only some of this effect will be offset if and when young trees replace them, sucking up carbon as they grow.

Canopies have collectively become younger across the world (see right-hand chart). The plunge has been sharpest in Europe, with average age falling by almost half, whereas the smallest reduction has occurred in South America—by about 9%. This may seem counterintuitive given the scale of deforestation in the Amazon. “Europe is declining fastest because it already started out with a very low average age in 1900, due to a long history of forest disturbance,” says Louise Parsons Chini, a co-author of the paper. Europe is also bucking the deforestation trend, so new young woodlands lower the average age in the mix. Between 1990 and 2015, the old continent’s forest cover has expanded by 90,000 square kilometres—an area as large as Portugal. In contrast, South America’s deforestation has served to make room for cropland or pasture. That means the area drops out of the calculation for the average age of its forests.

In any case, old trees are dying at a faster rate than in the past. In North America and Europe, where most data are available, tree-mortality rates have doubled in the past 40 years. Much of the loss is the consequence of decades of forest-harvesting, but rising global temperatures have also produced more wildfires, droughts and insect infestations. In recent years more fires have roared through Siberia, Australia and the Amazon. Droughts have grown longer and more severe. What is more, scientists suspect that more frequent fires and droughts have made trees less resilient to deadly insect invasions. For the first time, bark beetles have ravaged California’s giant sequoias, the largest living organisms on Earth, despite their bug-repelling tannins.

Although higher levels of carbon dioxide are generally assumed to nourish tree growth, the study suggests this may be true only where water and nutrients are abundant. As dry periods become longer, water-stressed plants shed leaves and close up their pores to avoid moisture loss, thus limiting the intake of the gas. “It’s like an all-you-can-eat buffet, but with duct tape over your mouths,” says Nate McDowell of the US Energy Department’s Pacific Northwest National Laboratory, who led the research published in *Science*. “Doesn’t matter how much food there is if you cannot eat it.” All this means the world’s forests are, collectively, becoming smaller, younger, shorter—and more vulnerable.

Source: <https://www.economist.com/graphic-detail/2020/08/19/the-world-is-losing-its-big-old-trees>