

Dry summer of 2018: One-tenth of central European forests lost leaves too early

November 2 2020



By July 2018, the leaves on many beech trees in northern Switzerland had started to wilt. Credit: Ulrich Wasem, WSL

In 10% of forests in central Europe, trees lost some or all of their leaves too early in the dry summer of 2018. This is shown by calculations and satellite image analyzes of the Swiss Federal Institute for Forest, Snow and Landscape Research WSL. Central and eastern Germany along with

the Czech Republic were the most severely affected. Since it was less hot and dry in the mountains, Swiss forests suffered less damage.

In Switzerland, the [drought](#) affected forests in the northern part of the country, on the southern slopes of the jurassic mountains and in the main valley of the Valais most severely, as the WSL research team reports in the journal *Global Change Biology*. It had programmed a [computational model](#) (algorithm) that used aerial photographs and satellite measurements to calculate the distribution of early foliage fall throughout central Europe—from northern Germany to northern Italy. Thanks to the new Sentinel earth observation satellites, this was possible for the first time in very high temporal (one image every 2-3 days) and spatial resolution (10 x10 meters).

The researchers also wanted to know which factors posed a particular risk of drought damage, such as soil depth and moisture, slope inclination and vegetation height. For this purpose, they used models developed at WSL that can show the vegetation cover and the [water balance](#) for the whole of Switzerland.

Severely affected locations

The result: Trees suffered most in warm, dry regions, where it was even hotter and drier than the long-term average, especially if they tended to be small to medium-sized and stood on steep terrain and shallow soils. In future, such locations and tree characteristics can thus be classified as [risk factors](#) for drought damage. "In a further step, we want to make a prediction model that can predict the potential damage to large [forest](#) areas," says Philipp Brun, who conducted the study together with colleagues from WSL and the University of Grenoble Alpes.

Spruces have suffered heavily

Deciduous and coniferous trees can be distinguished on the high-resolution satellite images. While in Switzerland, mainly [deciduous trees](#), particularly beech, dropped their leaves prematurely, Norway spruce were more affected over the whole of central Europe. A complete loss of needles is fatal for them. Later, many spruces weakened by the drought also died of bark beetle infestation.

In many countries, Norway spruce trees have been planted over the last 150 years extensively at the warm and dry limits of their distribution area, explains Brun. In 2018, both beech and spruce would have suffered conditions that were outside their tolerance range in many locations.

In the summer of 2018, central Europe experienced its most extreme period of drought and heat wave since measurements began. It has had a greater impact on forests than any other dry spell in the last 60 years. "If such events occur more frequently, beech and [spruce](#) will probably have difficulty surviving in the longer term in the regions affected in 2018," says study leader Niklaus Zimmermann, ecologist at WSL. Oak [trees](#) that need less water and are therefore better able to cope with drought have shown little leaf fall in the same regions.

More information: Philipp Brun et al. Large-scale early-wilting response of Central European forests to the 2018 extreme drought, *Global Change Biology* (2020). [DOI: 10.1111/gcb.15360](https://doi.org/10.1111/gcb.15360)

Provided by Swiss Federal Institute for Forest, Snow and Landscape Research WSL

Citation: Dry summer of 2018: One-tenth of central European forests lost leaves too early (2020, November 2) retrieved 23 May 2024 from <https://phys.org/news/2020-11-summer-one-tenth-central-european-forests.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.