

Pressemitteilung**Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft W****Beate Kittl**

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Geowissenschaften, Umwelt / Ökologie
überregional**Mega-droughts are becoming more frequent and intense worldwide**

A study led by the Swiss Federal Institute for Forest, Snow and Landscape Research WSL shows that there has been a worrying increase in the number of long droughts over the last 40 years. These affect agriculture, energy production and ecosystems, the research team warns in the scientific journal Science.

For fourteen years, northern Chile has been suffering from extreme drought. The southwest of the USA recently experienced eight bone-dry years, and southern Australia three. This accumulation is no coincidence: multi-year droughts have become more frequent, longer, and more extreme over the last 40 years, according to a study led by the WSL and published in the journal Science.

Their extent has increased by 50,000 km² per year during this period, which is significantly more than the area of Switzerland. 'Multi-year droughts cause enormous economic damage, for example in agriculture and power generation,' says Dirk Karger from WSL, who led the study.

The effects on ecosystems are also becoming increasingly severe. Grasslands, in particular, are reacting sensitively to droughts, which is evident from the loss of green color in satellite images. However, grasses can recover quickly. 'In the event of extreme water shortages, trees in tropical and boreal regions can die, resulting in long-term damage to these ecosystems. Boreal vegetation in particular will probably take the longest to recover from such a climate disaster,' says Karger.

Rising temperatures lead to more extreme weather

Typically, droughts only become noticeable when they damage agriculture or forests. However, there is little observational data for some regions, such as the tropical rainforest or the Andes. So the research team from WSL and the Institute of Science and Technology Austria (ISTA) used meteorological data to determine droughts by calculating anomalies in precipitation and in evaporation from soil and plants (evapotranspiration) over the last 40 years. From this, they created a drought index and also observed changes in vegetation during those drought events using global satellite data.

It was found that their method not only correctly modelled known droughts, such as those in the western United States (2008-2014), Australia (2017-2019) and Mongolia (2000-2011), but also those in less accessible areas such as the Congo rainforest (2010-2018), which are less well documented. The end result is a ranking of the worst multi-year droughts of the last 40 years, along with the underlying precipitation and evaporation patterns and their effects on vegetation.

Unsurprisingly, the reason for this lies in rising temperatures caused by climate change – on the one hand, they increase the variability of precipitation, leading to more extreme dry periods and more heavy precipitation. On the other hand, it increases evaporation from the soil and vegetation, a factor that has been underestimated by previous models. 'The severity of perennial droughts will become more and more severe with climate change,' says co-author Philipp Brun of

the WSL.

The work is based on the CHELSA climate data prepared by Dirk Karger, which goes back to 1979 and describes the climate in high resolution on all continents. 'Our drought inventory is the most comprehensive in the world for the last 40 years, at a resolution of five kilometres,' says WSL postdoc and lead author of the study Liangzhi Chen. It is publicly available and should help countries to be better prepared for future multi-year droughts.

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Dead vines in the region around Los Andes in the western catchment area of Aconcagua, a region that has been particularly hard hit by the ongoing drought in Chile.

Photo: Dirk Karger



Plant growth is only possible in tiny microhabitats where residual water collects and remains for a certain period of time.
Photo: Dirk Karger