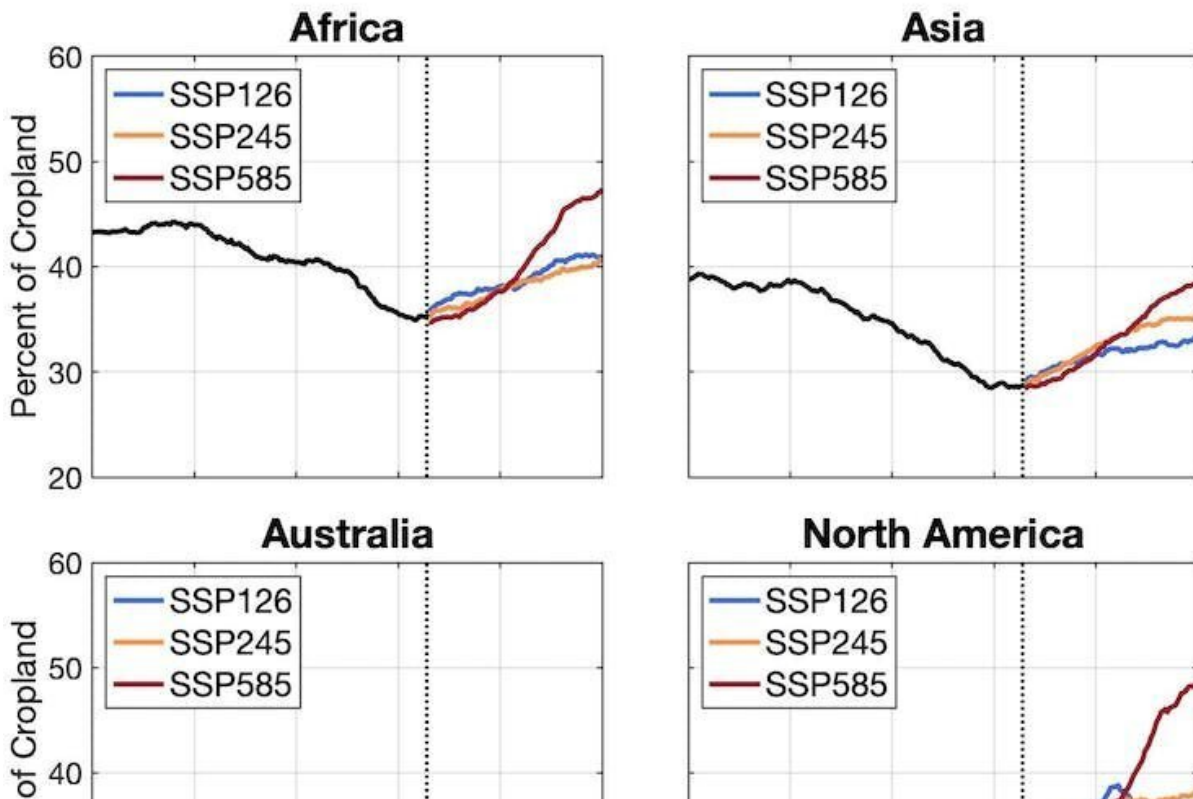


Farmers face a soaring risk of flash droughts in every major food-growing region in coming decades, new research shows

May 26 2023, by Jeff Basara and Jordan Christian

Cropland Experiencing Flash Drought



Climate models indicate that more land will be in flash drought in every region in the coming decades. Three scenarios show how low (SSP126), medium (SSP245) and high (SSP585) emissions are likely to affect the amount of land in flash drought. In some regions, rising global emissions will bring more extreme rainfall, offsetting drought. Credit: Jordan Christian

Flash droughts develop fast, and when they hit at the wrong time, they can devastate a region's agriculture.

They're also [becoming increasingly common](#) as the planet warms.

In a new study published May 25, 2023 in *Communications Earth & Environment*, [we found](#) that the risk of [flash droughts](#), which can develop in the span of a few weeks, is on pace to [rise in every major agriculture region](#) around the world in the coming decades.

In North America and Europe, cropland that had a 32% annual chance of a [flash drought](#) a few years ago could have as much as a [53% annual chance of a flash drought](#) by the final decades of this century. The result would put food production, energy and water supplies under increasing pressure. The cost of damage will also rise. A flash drought in the Dakotas and Montana in 2017 caused [US\\$2.6 billion in agricultural damage](#) in the U.S. alone.

How flash droughts develop

All droughts begin when precipitation stops. What's interesting about flash droughts is [how fast](#) they reinforce themselves, with some help from the warming climate.

When the weather is hot and dry, soil loses moisture rapidly. Dry air extracts moisture from the land, and rising temperatures can [increase this "evaporative demand."](#) The lack of rain during a flash drought can further contribute to the feedback processes.

Under these conditions, crops and vegetation begin to die much more quickly than they do during typical long-term droughts.

Global warming and flash droughts

In our new study, we used climate models and [data from the past 170 years](#) to gauge the drought risks ahead under three scenarios for how quickly the world takes action to slow [global warming](#).

If [greenhouse gas emissions](#) from vehicles, power plants and other human sources continue at a high rate, we found that cropland in much of North America and Europe would have a 49% and 53% annual chance of flash droughts, respectively, by the final decades of this century. Globally, the largest projected increases would be in Europe and the Amazon.

Slowing emissions [can reduce the risk](#) significantly, but we found flash droughts would still increase by about 6% worldwide under a low-emissions scenario.

Timing is everything for agriculture

We've lived through a number of flash drought events, and they're not pleasant. People suffer. Farmers lose crops. Ranchers may have to sell off cattle. In 2022, a flash drought slowed barge traffic on the Mississippi River, which carries more than 90% of U.S. agriculture exports.

If a flash drought occurs at a critical point in the growing season, it could devastate an entire crop.

Corn, for example, is most vulnerable during its flowering phase, [called silking](#). That typically happens in the heat of summer. If a flash drought occurs then, it's likely to have extreme consequences. However, a flash drought closer to harvest can actually help farmers, as they can get their

equipment into the fields more easily.

In the southern Great Plains, [winter wheat](#) is at its highest risk during seeding, in September to October the year before the crop's spring harvest. When we looked at flash droughts in that region during that fall seeding period, we found greatly reduced yields the following year.

Looking globally, paddy rice, [a staple](#) for more than half the global population, [is at risk](#) in northeast China and other parts of Asia. Other crops are at risk in Europe.

Ranches can also be hit hard by flash droughts. During the [huge flash drought in 2012](#) in the central U.S., cattle ran out of forage and water became scarcer. If rain doesn't fall during the growing season for natural grasses, cattle don't have food, and ranchers may have little choice but to [sell off part of their herds](#). Again, timing is everything.

It's not just agriculture. Energy and [water supplies](#) can be at risk, too. [Europe's intense summer drought in 2022](#) started as a flash drought that became a larger event as a heat wave settled in. Water levels fell so low in some rivers that [power plants](#) shut down because they couldn't get water for cooling, compounding the region's problems. Events like those are a window into what [countries are already facing](#) and could see more of in the future.

Not every flash drought will be as severe as what the U.S. and Europe saw in 2012 and 2022, but we're concerned about what may be ahead.

Can agriculture adapt?

One way to help agriculture adapt to the rising risk is to improve forecasts for rainfall and temperature, which can help farmers as they make crucial decisions, such as whether they'll plant or not.

When we talk with farmers and ranchers, they want to know what the weather will look like over the next one to six months. Meteorology is pretty adept at short-term forecasts that look out a couple of weeks, and at longer-term climate forecasts using computer models. But flash droughts evolve in a midrange window of time that is difficult to forecast.

We're tackling the challenge of monitoring and [improving the lead time and accuracy of forecasts](#) for flash droughts, as are other scientists. For example, the [United States Drought Monitor](#) has developed an [experimental short-term map](#) that can display developing flash droughts. As scientists learn more about the conditions that cause flash droughts and about their frequency and intensity, forecasts and monitoring tools will improve.

Increasing awareness can also help. If [short-term forecasts](#) show that an area is not likely to get its usual precipitation, that should immediately set off alarm bells. If forecasters are also seeing the potential for increased temperatures, that heightens the risk for a flash drought's developing.

Nothing is getting easier for farmers and ranchers as global temperatures rise. Understanding the risk from flash droughts will help them, and anyone concerned with water resources, manage yet another challenge of the future.

More information: Jordan I. Christian et al, Global projections of flash drought show increased risk in a warming climate, *Communications Earth & Environment* (2023). [DOI: 10.1038/s43247-023-00826-1](https://doi.org/10.1038/s43247-023-00826-1)

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