

# Rising temperatures lead to increased fire risk in Indonesia

May 2 2017, by Francesco Fiondella

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Heavy smoke blanketed Sumatra and Borneo in September and October 2015, as observed by NASA's Terra satellite. Credit: NASA image by Jeff Schmaltz, LANCE/EOSDIS Rapid Response

A new paper published in the journal *Environmental Research Letters*, shows that rising temperatures have increased the risk of fires even during non-drought years in Indonesia, possibly making mild fire seasons in the country a thing of the past. The study was conducted by scientists at IRI, the International Center for Tropical Agriculture (CIAT), Temple University and the Center for International Forestry Research (CIFOR).

## What do we know about climate and fires in Indonesia?

We know that El Niño events increase the likelihood of [drought](#) in Indonesia, and with that, the risk of wildfires. Uncontrolled fires, like those which occurred in 2015 and 1997-1998 can destroy vast swaths of diverse tropical forests, release billions of tons of carbon dioxide and create public-health emergencies across the region.

More recently, we have observed spikes in fire activity in years not associated with El Niño, when the dry season is not particularly dry. Such a spike occurred in Sumatra in 2013.

The question we set out to investigate was whether other climate variables beside rainfall could be playing a role in determining the level of fire activity during times when seasonal droughts were not severe.

## **What were the main findings of your study?**

We found that atmospheric [temperature](#), whether it happens to be warmer- or cooler-than-normal, is not significantly relevant to fire occurrence during drought years in Indonesia. In other words, once droughts are established we should expect to see more fires regardless of temperature. The reason why fire activity goes up during drought years is because there's increased [water stress](#) and flammability in vegetation—the plant matter dries out.

However, in years during which rainfall is normal or above average, above-normal temperatures increase both evapotranspiration rates and vegetation water stress, which leads to a higher risk of fires.

In addition, our simulations show that precipitation is projected to remain unchanged in the coming decades in Indonesia, but temperatures are expected to continue increasing. So understanding temperature's effect on fire occurrence is going to be extremely relevant.

## How can this knowledge be used?

Efforts to prevent fires in Indonesia focus on drought years, and this may be addressing only part of the risk. Prevention and mitigation measures can benefit from a deeper understanding of how fire behave in non-drought conditions as well.

In addition, strategies to reduce greenhouse-gas emission through forest restoration and conservation programs should take into account the effect of warmer environment on fires. Mild [fire](#) seasons in Indonesia are currently associated with wet and cool conditions, but these conditions are expected to become less frequent in the coming decades.

**More information:** Kátia Fernandes et al. Heightened fire probability in Indonesia in non-drought conditions: the effect of increasing temperatures, *Environmental Research Letters* (2017). [DOI: 10.1088/1748-9326/aa6884](#)

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