

Attributing Extremes to Climate Change

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Previous bulletins described the link between climate change and extreme weather ([Part 1](#)) and the impacts on forests ([Part 2](#)). This bulletin highlights the emerging field of **event attribution** science, which estimates exactly how much human-induced climate change contributes to individual extreme events.

Event Attribution

This area of research was sparked just over a decade ago, by discussions about liability for damages from climate change-related extremes. The field has grown considerably since then, with major advancements in the last five years. In some cases, researchers can now go beyond the standard line that “no individual weather event can be attributed to climate change,” and provide quantitative estimates of how much the likelihood, frequency, or magnitude of an event was influenced by anthropogenic warming.

HOW IT'S DONE

The historical record and model simulations are used.

WHAT'S NEW?

In recent years, there has been rapid progress in the sophistication of the science and the speed of analysis. Attribution assessments can now be made within weeks of an event (through cooperative efforts like the [World Weather Attribution](#) project, for example), rather than many months. These advances are due to improved scientific understanding of the mechanisms that produce extremes, improved methodology, and increases in computing power.

HOW RELIABLE IS IT?

Some extreme events can be attributed to climate change more confidently than others. We have the greatest confidence in studies with: (1) a solid understanding of the underlying physical mechanisms, (2) consistent evidence from a high-quality observational record, and (3) climate models that can accurately simulate and reproduce the relevant class of extreme event.

Generally, extremes that are more directly linked to temperature can be attributed to climate change with greater confidence. For example, heatwaves can more easily be attributed with confidence than wildfires or convective storms. See [Table 1 in the full bulletin for a ranking of different types of extremes in terms of the three criteria listed above.](#)

The full bulletin also includes details about a [recent example from Texas](#), where a record-setting drought and heatwave in 2011 had massive impacts on the forest industry and was partly attributed to human-induced climate change.

Using Attribution Information to Inform Forest Management

Event attribution research will more accurately pin down the role of climate change in extremes that can have a huge influence on forest health and productivity. By helping to differentiate between truly rare events and those that represent part of an on-going trend, this new information will improve our understanding of risk and help guide management, because the way we perceive and frame the causes of an event influences how we respond to it. If attribution studies suggest a particular extreme event is part of an on-going trend (rather than a rare, one-off occurrence), it may warrant a shift in management. See *the full bulletin for [example forest management scenarios](#) that illustrate this idea in practice.*

Our ultimate goal is to discern signal from noise in forest trends, by combining the rapidly evolving science of attribution with enhanced forest monitoring through Manomet's [Resiliency Assessment Framework](#), which will enable more effective management that reduces vulnerability and capitalizes on potential advantages.

Click on the sub-headings above to go directly to the corresponding section of the full bulletin, or read the complete bulletin online: <http://climatesmartnetwork.org/2017/01/attributing-extremes-to-climate-change/>