

Buried in mud: Wildfires threaten North American water supplies

February 11 2020, by François-Nicolas Robinne, Dennis W. Hallema and Kevin D. Bladon



The Rim Fire burned 256,000 acres of the Stanislaus National Forest and Yosemite National Park in 2013. Credit: USDA Forest Service, Chris Stewart

As rain offers a welcome relief to fire-scorched Australia, concerns over flash floods and freshwater contamination cast a shadow on the joy. Already, [massive fish kills](#) have been reported due to heavy ash and sediment in local stream.

[Local reservoirs](#) and municipal water supplies might become so polluted from the fires that the current water supply infrastructure will be challenged or could no longer treat the water.

Flash floods and [water contamination](#) after large-scale wildfires are emerging as real hazards in Australia and many other places, threatening drinking water, ecosystems, infrastructures and recreational activities.

Water supply from forests is at risk

In many ways, this is not surprising. Forests [provide water](#) to 90 percent of the world's most populous cities, and most of these forests already yield degraded water quality. Forests also provide other [essential water services](#) like flood control, hydroelectricity, fishing and recreational opportunities.

Our [recent global analyses](#) clearly showed Australia's water supply was at high risk from wildfires. We also found areas on every continent except Antarctica face similar risks. In North America, [larger and more severe fires](#) have created new challenges for forest and water managers.



The 2015 Stouts Creek Fire in Oregon led to more runoff and erosion. Credit: Kevin Bladon

Post-fire water hazards

Wildfires can have many detrimental impacts on water supplies. The effects can last for [multiple decades](#) and include drinking water pollution, reservoir sedimentation, [flash floods](#) and reduced recreational benefits from rivers.

These impacts represent a growing hazard as populations expand, and communities encroach onto [forest](#) landscapes.

Looking closer, wildfires [change the amount of water that comes from](#) upstream forests and the seasonal timing of water flows. Such changes complicate water resource allocation as less water might be available during periods of high demand.

When rainstorms follow large and severe wildfires, they tend to flush ash, nutrients, [heavy metals and toxins](#), and sediments into streams and rivers. This contamination from wildfires causes problems for the health of downstream rivers and lakes, as well as safe drinking water production.

Mercury, which can be deposited on leaves and absorbed by plants, is a particular concern. During a fire, [mercury may be re-emitted in large amounts and deposited](#) in nearby lakes, wetlands and other water, where [it accumulates](#) in the food web, and into fish, that are caught and eaten by people. Indigenous communities living in fire-prone forests in Canada and who already struggle with mercury contamination might be particularly exposed.



Boulders moved in the 2018 Montecito mudslide. Credit: WERF, 2018

Risks in North America

Polluted water creates many expensive, difficult and long-lasting challenges for the drinking water treatment process. For example, water remained difficult to treat for [15 years after](#) after the 2002 Hayman fire in Colorado.

The quality of the post-fire water increased the chances of forming undesirable byproducts of [water disinfection](#). These [toxic chemicals](#) had

to be removed before the water could be supplied to more than half a million users in Denver.

But most of the fire-prone areas in North America lack large-scale vulnerability assessments of their municipal water supplies—and not because the risks are inconsequential.

In Canada and the United States, one large and severe wildfire might increase drinking water production costs by US\$10 million to US\$100 million. In southern California, [mudslides from heavy rainfall](#) after wildfires caused 23 deaths and produced more than US\$100 million of structural damage in 2018.

The financial burden of these changes is eventually carried by taxpayers. Adopting nature-friendly solutions to reduce severe wildfires in upstream forests, such as [prescribed burns](#) under controlled conditions, will lower the bill and provide better protection of water services.

Protecting the source

Forest health is [already declining across Canada](#) and the [United States](#). This trend will likely continue because of [climate change and land degradation](#) linked to human activities.

Climate projections suggest that fires will happen [more frequently](#) and become [more severe](#). [Urban sprawl](#) also increases the likelihood of these fires happening in the vicinity of homes.

Combined with increased rainfall and declining snowfall, this makes river flows and the quality of surface water less predictable.

Consequently, water supplies become [less reliable](#).

In light of these environmental changes and the inevitability of wildfires,

countries like Canada and the United States can expect [cascading hazards](#) with impacts similar in magnitude to what is now happening in Australia.

Therefore, governments need to seize [existing opportunities](#), such as leveraging existing data and taking advantage of growing computing power, to measure [wildfire risk to water supplies](#). A tailored [wildfire](#)-water risk reduction strategy can help achieve better source water protection, improve infrastructure and foster preventive disaster planning.

There is no doubt we will learn more as our knowledge of [Indigenous forest management practices](#) improves. Instead of reinventing the wheel we must try to keep water in the landscape by restoring wetlands, and accept a [helping hand](#) when offered.

Because ultimately, forests and clean [water](#) resources are of paramount importance to our own future.

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