How wildfires contaminate drinking water sources

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Credit: University of Colorado at Boulder

Wildfires can contaminate nearby streams and watersheds

through mobilization of sediments, nutrients and dissolved organic matter, straining the capabilities of downstream municipal treatment facilities, a new report co-authored by CU Boulder researchers shows.

The research, which was funded by The Water Research Foundation (WRF) and presented at CU Boulder earlier this month, outlines a multitude of challenges posed by wildfires, including short- and long-term effects on the availability and quality of drinking water sources used by major metropolitan areas such as Denver, Colorado. The report also outlines potential remediation solutions to help utilities plan for worst-case scenarios.

"A great number of drinking water utilities draw water from forested watersheds," said Fernando Rosario-Ortiz, an associate professor in CU Boulder's Department of Civil, Environmental and Architectural Engineering and the lead author of the report. "When these watersheds are impacted by a wildfire, the impacts on source water quality can be severe, forcing utilities to respond in order to continue to provide safe drinking water to their customers."

Wildfires have increased in duration and extent in recent decades due to climate change, creating concern about added strain to existing treatment resources. The 2012 High Park Fire burned sections of the Cache la Poudre watershed, which serves northern Colorado communities including Fort Collins. That same year, the Waldo Canyon Fire burned through Pike National Forest, temporarily jeopardizing water supplies for Colorado Springs.

While ecologists and land managers have studied fires extensively, the scope of post-wildfire effects on drinking water remains uncertain. Current research indicates that fires can degrade surface water quality through erosion, ash deposition, increased sediment loads and/or elevated nutrient runoff (i.e., nitrogen and phosphorus) that can spur

algal blooms.

To simulate the effects of a medium-temperature wildfire, the researchers heated soil and organic deadfall in a furnace to 225 degrees Celsius (437 degrees Fahrenheit). The materials were then leached into tap water and treated using conventional processes.

The results showed that the heated materials increased the turbidity of the water and responded poorly to chemical coagulants, leading to additional downstream filtration difficulties.

"Our work has shown that source waters impacted by wildfires can be difficult to treat, resulting in additional costs in the form of additional chemical coagulants and the potential need for capital improvements," Rosario-Ortiz said.

A recent workshop conducted at CU Boulder brought together representatives from different water utilities across the Front Range to discuss the challenges posed by wildfires, including the aforementioned issues with water quality and the need to coordinate the response with local and federal agencies.

The report recommends that utilities serving fire-prone regions of the U.S. expand water storage capacity, expand use of pre-sedimentation basins and diversify clean water sources in order to prepare for potential disasters.

Provided by University of Colorado at Boulder