Drinking water: lessons from a decade of extreme weather

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(Phys.org)—While extreme weather events will inevitably impact water quality, the biggest risk to public health is not the intensity of these events but their increasingly close proximity to one another, UNSW researchers warn.

Environmental engineers at UNSW conducted a review of extreme weather events in Australia over the past 14 years to assess their impact on raw and treated water, and various supply infrastructures.

In some of these cases, they observed "rapid and unprecedented changes

to raw water quality" and major obstacles to the provision of clean drinking water due to infrastructure damage and loss of electricity supply to treatment facilities.

Interestingly, the most severe impacts on water quality didn't occur from the most "extreme" events on their own, but from multiple "significant" events occurring in relatively quick succession.

"Throughout the case studies we noticed a very stark trend, which was that most of the significant water quality impacts came from a series of sequential events rather than from a single event," says Dr Stuart Khan, a water quality expert from the School of Civil and Environmental Engineering at UNSW.

Khan says the finding went against their initial assumption "that increased frequency of extreme weather events would simply lead to increased frequency of the water quality impacts".

"A one in 100 year flood seems more significant than a one in 10 year flood because of the extent of the impact on the catchment and the general population," says lead author Shona Fitzgerald, a research assistant at the UNSW Water Research Centre.

"But in fact, we found that the water quality impact of a one in 10 year flood, in combination with other factors, could be worse than an event considered more extreme, or rare."

The results suggest, for instance, that a bushfire or drought followed by a heavy rainfall event would lead to far worse water quality impacts than either of those events would normally cause alone – even if they were considered very extreme.

After a bushfire, there is lots of ash on the ground, which contains high

loads of the nutrient phosphorous. In time, this will be stabilised in soil and assist new plant growth. But if a heavy rainfall event comes along before that stabilisation can occur, this ash will wash into waterways leading to detrimental impacts on water quality. A subsequent hot weather event can lead to an algal bloom in water supply reservoirs, further impacting water quality.

"This finding highlights the need to consider combinations of weather events, and their cumulative effects, in planning and preparing for the resulting impacts on drinking water supply," says Fitzgerald.

"Over the coming decades, one of the biggest challenges for water utilities will be managing uncertainty around climate change. On the ground, this means being able to adapt and learn from past experiences."

The researchers examined 10 case studies involving bushfires, droughts, flooding, heavy rainfall and high winds from across five Australian states from 1998 to 2012.

The project was funded by the Water Research Foundation with contributions from the Water Services Association of Australia and more than 50 water utilities from Australia and the USA.

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