# Flood disaster risk is more complex than expected

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Flooding in Key Haven caused by hurricane Wilma on 10/24/2005. Credit: Marc Averette/Wikipedia

Research from the University of Adelaide has shed further light on the complex issue of flood risk, with the latest findings showing the potential for flood risk to both increase and decrease in the same geographic area.

A team from the University's School of Civil, Environmental and Mining Engineering has presented the findings of their study in the latest issue of *Nature Climate Change*, highlighting the differences between flood events.

There are two major types of floods from rivers: one is caused by heavy rain sustained over long periods of time that might affect large catchments over a wide geographic area; the other is caused by short but extremely heavy rain events, which might only last for 30 minutes and is usually localised, often called "flash flooding".

"One of the common assertions of the climate change discussion is that 'flood risk will increase'. And on balance, yes that's probably correct, but we've found the issue is much more complex than such a blanket statement," says corresponding author and Senior Lecturer Dr Seth Westra.

"At the global scale we're increasingly confident that flood risk will change, because a warming atmosphere means more heavy rain. However, for any individual location the changes to flood risk will depend on each region's rainfall patterns. Under certain circumstances the flood risk may actually decrease," he says.

The team, including the paper's lead author Dr Feifei Zheng and co-author Dr Michael Leonard, analysed data from rainfall gauges across the greater metropolitan area of Sydney. This data had been collected every five minutes from 1966 to 2012, representing a wealth of information.

"Our research reveals that short but intense rainfall events increased, while longer sustained heavy rainfall events tended to decline. This has complicated implications for flood risk, since floods in small catchments are usually caused by short rainfall events, whereas floods in large

catchments require longer periods of heavy rainfall," says Dr Zheng, a senior Research Associate from the School of Civil, Environmental and Mining Engineering.

"Our results also show a distinct seasonal variation. In summer, extreme rainfall increased strongly, while in the remaining seasons the changes were smaller and sometimes extreme rainfall even decreased," Dr Zheng says.

This research group is at the forefront of research looking at the impact of short-duration rainfall, and how that may be affected by climate change. Dr Westra says each region will have its own unique features that determine the flood risk from both short and long-term rainfall events.

"You can't directly compare patterns in Sydney with those of Brisbane, Adelaide, or even New York or London, because each area is unique. But what we are showing is that historical changes to rainfall patterns are much more complicated than is commonly appreciated. This means there's a lot more nuance in how flood disasters might change as a result of climate change, which hasn't been part of the commentary on flood risk until now," Dr Westra says.

**More information:** "Opposing local precipitation extremes" *Nature Climate Change* 5, 389–390 (2015) DOI: 10.1038/nclimate2579

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