RESEARCH BRIEF

Foxton, Horowhenua, after record-breaking catastrophic rainfall, 19–22 June 2015. Rghenry / DepositPhotos

Beyond living memory:
Why past rainfall extremes misrepresent future risk

Relying on historical observations of rainfall means we underestimate the risk of future, unprecedented extreme rainfall events across New Zealand. Society tends to adapt only to the most extreme events experienced within living memory, which compounds this problem and leaves communities under-prepared.

This research finds the range of plausible future rainfall events is far wider than the historical record suggests. Decision-makers must plan for extreme rainfall despite this uncertainty, with confidence that events will become more intense and frequent under climate change.

Summary of findings

- Preparation for extreme rain shouldn't be determined principally by events in living memory or historical records.
- Short-term historical rainfall records may often lead to under-preparedness.
- The range of plausible future rainfall events is much larger than records show.
- The probability and intensity of extreme rainfall will increase under climate change.
- Decision-makers must plan for extreme rainfall despite uncertainty and increasing variability.

Climate Extremes & Societal Impacts
THE UNIVERSITY OF WAIKATO

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Earth Sciences New Zealand

UC UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Funding support from:

Natural Hazards Commission
Toka Tū Ake

Who is this research brief for?

Civil defence and emergency management agencies, territorial authorities and regional councils, infrastructure providers, the insurance sector, climate adaptation planners, researchers, people communicating natural hazard risk.

Research team

- Luke Harrington, Senior Lecturer in Climate Change, University of Waikato
- Muhammad Fikri Sigid, Doctoral Researcher, School of Science, University of Waikato
- Hamish Lewis, Lecturer in Climate Change, University of Waikato
- Trevor Carey-Smith, New Zealand Institute for Earth Science Limited
- Suzanne Rosier, New Zealand Institute for Earth Science Limited
- Dave Frame, Professor of Physics, University of Canterbury
- Collaborators: Iris de Vries and Erich Fischer, Institute for Atmospheric and Climate Science, ETH Zurich, Switzerland

Research project info

How misleading are past experiences of rainfall? January 2024 – January 2027

Funded by Toka Tū Ake Natural Hazards Commission (University Research Programme, Grant ID: URP3764)

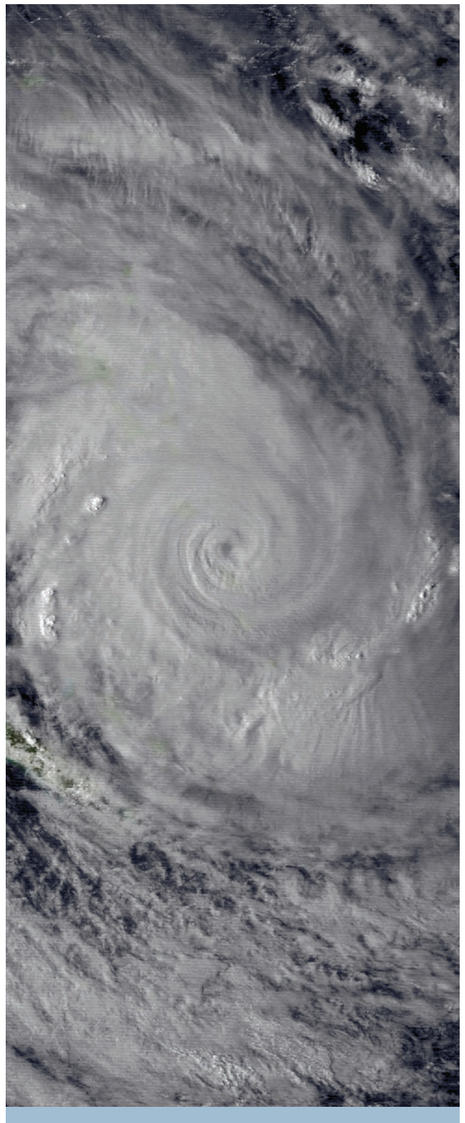
Key publications

Sigid, M. F., Harrington, L. J., and Carey-Smith, T. (2025). Understanding past record-shattering rainfall events in New Zealand. Environmental Research: Climate, vol. 4, no. 4, Art. no. 045014. https://doi.org/10.1088/2752-5295/ae1860

Sigid, M. F., Harrington, L. J., deVries, I., Rosier, S., Lewis, H., & Fischer, E. (2026a). Quantifying uncertainty in the perceived risk of unprecedented rainfall. Earth's Future, 14, e2026EF008121. https://doi.org/10.1029/2026EF008121

Sigid, M. F., Harrington, L. J., & Lewis, H. (2026b). On the future of extreme rainfall in New Zealand. Earth's Future, 14, e2025EF007427. https://doi.org/10.1029/2025EF007427

Please use the following citation
Luke Harrington (September 2026). *Beyond living memory: Why past rainfall extremes misrepresent future risk.* Research brief, 20 pages (prepared by Annabel McAleer and Rebecca McMaster). University of Waikato. https://doi.org/10.15663/1522.wbsk



Cyclone Bola, 1988. VISSR imagery on the GMS-3 satellite, colourised by Nino Marakot. Japan Meteorological Agency. CC BY 4.0

Contents

Throughout this brief, **'What you might hear people say'** boxes flag common misconceptions and give you a ready response for community engagement.

Tukituki Valley, Hawke's Bay after Cyclone Gabrielle, 15 February 2023, Mark Palmer. Hastings District Library. CC BY-NC-ND 4.0

Summary of findings

- **Preparation for extreme rain shouldn't be determined principally by events in living memory or historical records.** Extreme rainfall is inherently random and New Zealand has high natural variability. Some places have simply been statistically lucky so far, and it's easy to assume good historical luck means low future risk. Conversely, some places have been statistically unlucky, and people may assume bad historical luck means high future risk.

- **Short-term historical rainfall records may often lead to under-preparedness.** Even careful, evidence-based planning may result in under-preparation, because our observed evidence base is too short to represent the full range of what is possible.

- **The range of plausible future rainfall events is much larger than records show.** The estimated annual probability of a "worst-in-century" event can vary by a factor of 200 (see page 13). Two areas with identical underlying statistical likelihood of extreme rainfall could have completely different historical records purely by chance. This gives us low confidence in observationally derived return period estimates ("one-in-N-year storm").

- **The probability and intensity of extreme rainfall will increase under climate change.** While it's impossible to predict the magnitude of the next worst-in-century event, it may resemble the most catastrophic storms in recorded history and be more widespread, affecting more than 10% of the country at once.

- **Decision-makers must plan for extreme rainfall despite uncertainty and increasing variability.** Two approaches are recommended: adaptation measures for increasingly frequent extreme rainfall events, and building emergency and financial resilience for rare, catastrophic events.

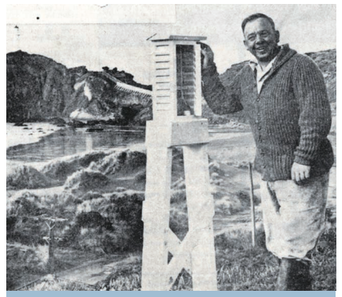
Why this research matters

People commonly use the most extreme event in living memory as a benchmark for what is plausible in the future. This collective living memory can lead to biased risk perception if events perceived as unprecedented were unusually mild, or unusually severe, compared to the true underlying probability.

New Zealand recently experienced two rainfall events in close succession that were more extreme than our living memory: the Auckland Anniversary Weekend floods in January 2023, and Cyclone Gabrielle in February 2023. It was unclear whether these events were actually the most severe in New Zealand's recorded history, the return period of such events, or how regional extremes may be changing in frequency and intensity due to climate change.

This research aimed to improve understanding of the scale and likelihood of plausible rainfall extremes in New Zealand. This will support adaptation planning, risk assessment and infrastructure decision-making, and ultimately mitigate potential harm from the under-estimation of risk.

After Cyclone Gabrielle caused a bridge collapse cutting off Dartmoor, Hawke's Bay, soldiers from the 2nd Engineer Regiment and HMNZS Te Mana's Ship's Company crossed the river carrying fuel in jerry cans to reach the community with much-needed supplies. NZDF



Castlepoint Lighthouse Keeper Taffy Williams at the weather station situated by the lighthouse c1956-57. Wairarapa Archive - 537102

What the research did

Stage 1: We determined extreme rainfall events in living memory

Using data from 307 weather stations, each with ≥70 years of rainfall records, we determined New Zealand's most extreme rainfall events in living memory, relative to regional norms. Only rainfall lasting from one to five days was included; intense localised thunderstorms were outside the scope. This allowed us to compare the relative severity of extreme rainfall events that have occurred (Sigid et al, 2025).

Stage 2: We modelled the true likelihood of extreme rainfall

We then examined how well this historical record represents the true likelihood of extreme rainfall. To do this, we ran a high-resolution climate model (Weather@Home) over 3200 times, each run generating a plausible year of New Zealand weather consistent with real-world sea and atmospheric conditions from 2006–2015. From this pool of 3200 plausible years we randomly drew 100 years to create a plausible century, and we did this 10,000 times to create 10,000 hypothetical centuries. We then identified the single worst modelled rainfall event in each hypothetical century to represent the most unprecedented event people might plausibly experience in a lifetime. This allowed us to predict the statistical likelihood of experiencing extreme events within many different, naturally variable 100-year windows (Sigid et al., 2026a).

Stage 3: We modelled the influence of future climate scenarios on rainfall extremes

Finally, we looked to the future to understand the increased chances of extreme rainfall under climate change. Using high-resolution climate projections (CMIP6, downscaled to ~12 km) we compared a 30-year historical window (1985–2014) to a 30-year future window (2070–2099) to understand how one-day and three-day rainfall extremes may change under moderate (SSP2-4.5) and high (SSP3-7.0) emissions scenarios. We used a threshold (the third-most extreme event in the historical record) to avoid outliers distorting future projections (Sigid et al., 2026b).

What the research shows

Many regions have experienced very large rainfall events

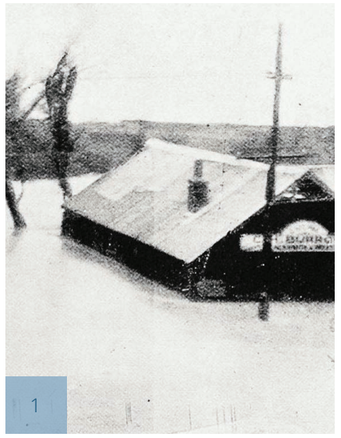
Extreme rainfall events in our historical record vary widely between regions and even weather stations. The past record features some rainfall events so large they would have appeared statistically impossible, based on recorded observations up to that point.

In our historical record, some regions have been statistically lucky and others unlucky. However, a lack of past extreme events in a locality does not mean that future risk is low. King Country and Wairarapa had no significant extreme rainfall events in the historical record up to 2024, used in this research. Both regions experienced floods in 2026.

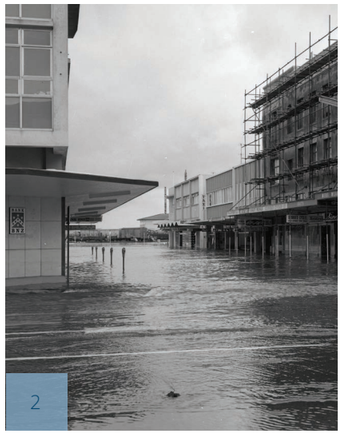
The single most extreme event on record, relative to local norms, was the May 1923 Canterbury storm, which delivered over 600mm in two days – the same amount of rain that falls in Christchurch over a full year, on average. This caused extensive destruction across more than 20,000km^2 of the South Island's east coast. It was more extreme than Cyclone Bola in 1988, regarded as one of the most intense weather events in recorded history.

Other under-recognised record-shattering rainfall events include the February 1971 floods in Taranaki and the January 1984 event in Southland. All three exceptional events occurred more than forty years ago, with no noteworthy events occurring in the same locations since then.

Over time, fewer people remember these events, shifting our collective perception of risk and what is 'unprecedented'.



1



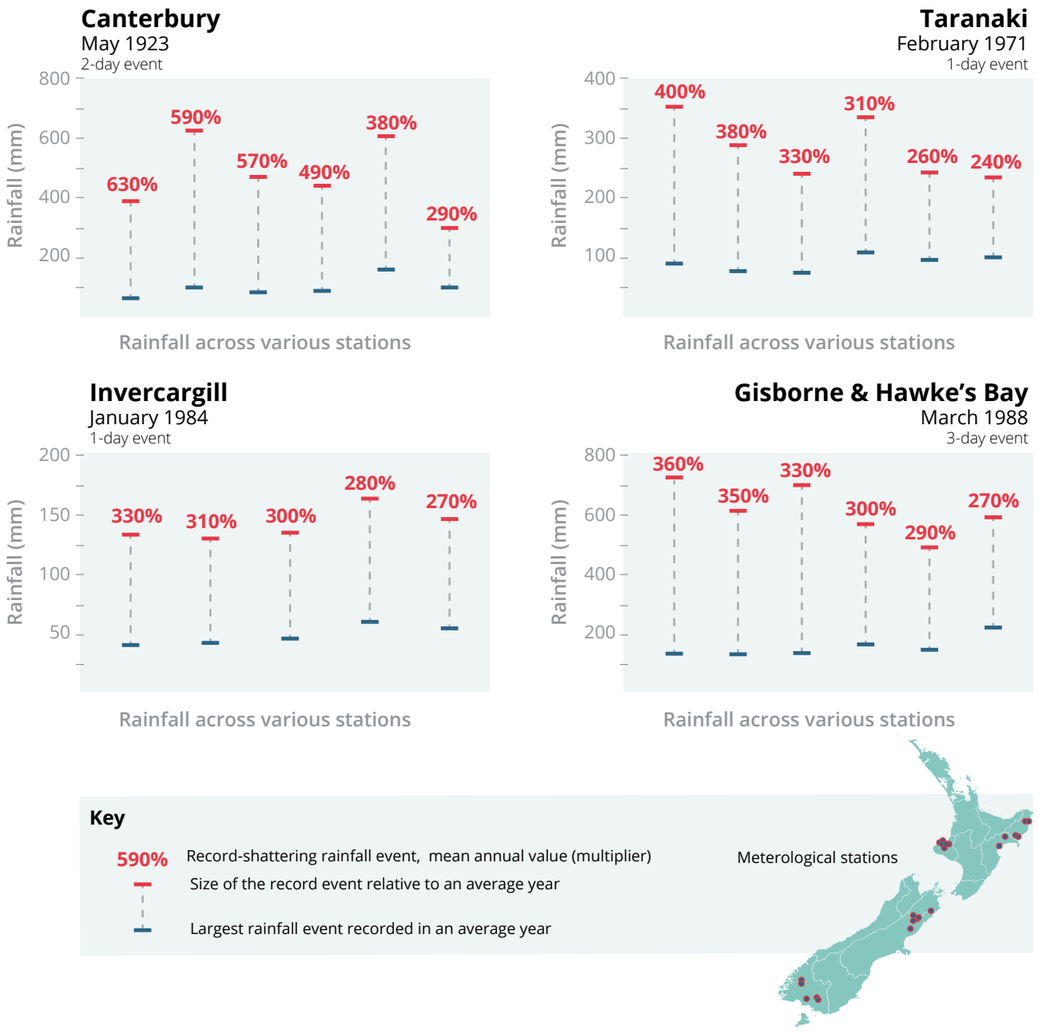
2

3

1. May 1923 Canterbury storm, Kaikōura, published in a supplement to the *Auckland Weekly News*, 24 May 1923, p37. Auckland Libraries Heritage Collections AWNS-19230524-37-03 (cropped)
2. New Plymouth, 25 February 1971, streets in flood, Bernard Woods Studio. Puke Ariki WD.020810 (cropped)
3. Southland 1984 flooding at Tuatapere, John Fraser. Central & Western Murihiku Southland Archive, CWA.012.052.003 CC-BY

The most extreme rainfall event in recent history was in Canterbury 1923

The four most exceptional widespread rainfall events, relative to local norms, from the records of 307 weather stations, each with ≥70 years of rainfall records.



The likelihood of extreme rainfall is highly variable

By simulating thousands of hypothetical centuries, we found that analyses based on short observational records may significantly misrepresent the true distribution of statistical risk of extreme rainfall events.

Each hypothetical century was equally possible, based on our actual lived climate from 2006–2015. In some hypothetical centuries, the single worst modelled rainfall event – the most unprecedented event people might experience in a lifetime – is fairly routine and might statistically be expected every 20 years. In other centuries, the worst event is so exceptional it might only occur once in 5000 years.

The 'lucky', or least extreme, centuries modelled tended to produce worst-in-century rainfall events that are around 70–100% of what you'd statistically expect. The most extreme 'unlucky' hypothetical centuries produced worst-in-century events that are two or three times larger than what was statistically expected.

This variability also differs by region. Northland is among the most variable regions in the country: in one century, the worst event might produce around half the rainfall expected, or more than double it. Wetter regions on the West Coast of the South Island tend to be less variable.

These findings suggest the range of plausible future rainfall events is much larger and more variable than expected.

Rainbow Falls, Kerikeri was subject to three consecutive extreme rainfall events in March and April of 2026. Pkphotoscom / iStockPhoto

WHAT YOU MIGHT HEAR PEOPLE SAY ABOUT THIS

"We've always had extreme rainfall in New Zealand. We managed then so we'll manage now."

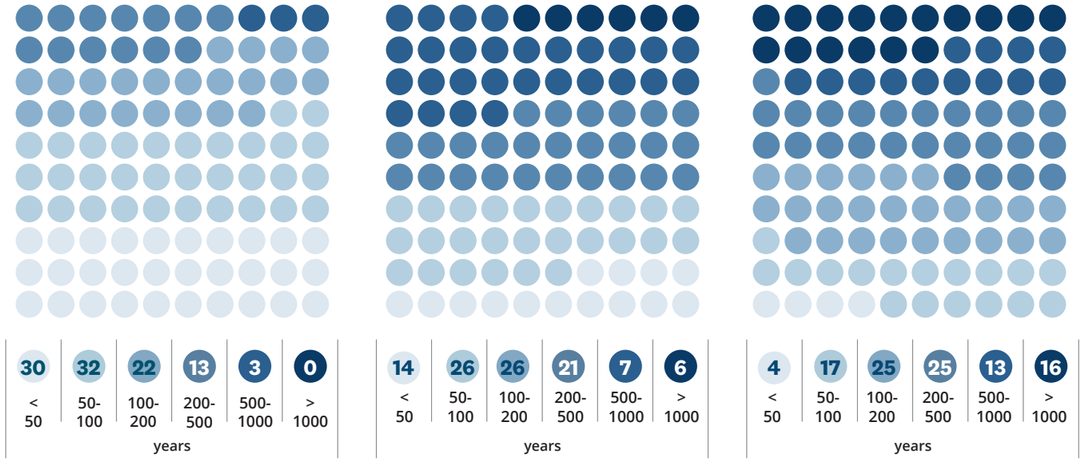
We have always had extreme rainfall events in New Zealand, just as we have always had earthquakes and volcanic activity. These extreme rainfall events cause deaths, and billions of dollars in economic harm.

It is important that we become better prepared for extreme rainfall in future, because it will increase in frequency and intensity due to climate change. As global temperatures rise, the atmosphere holds more water vapour and the oceans more heat, which means more moisture is available to fall as rain. This could increase the intensity of peak rainfall by 5%–12% per degree of warming in future, with more frequent heavy rain, and the most extreme events covering larger areas of New Zealand (Sigid et al, 2026b).

Luck determines whether 3% or 30% of New Zealand is hit by the rarest rainfall events

In models of hypothetical centuries based on our present-day climate, luck determines a wide range of outcomes. The luckiest century sees just 3% of the country hit by very rare extreme rainfall at some point (>1-in-500-year events). In an unlucky century, that rises to nearly 30% of the country, a tenfold increase. Climate change will make unlucky centuries increasingly likely over time.

Each dot is 1% of New Zealand's land area, shaded by the rarest rainfall event it experiences over the century.



Extremely lucky century
1st percentile

Most likely century
50th percentile

Extremely unlucky century
99th percentile

WHAT YOU MIGHT HEAR PEOPLE SAY ABOUT THIS

"What's 'luck' got to do with it? Our region's geography means we are safer here."

'Luck' means that outcomes are random. This research finds that rare, catastrophic rainfall events can occur at random anywhere in New Zealand.

Rainfall events are defined as extreme compared to what's expected for that location. Rainfall is influenced by local geography; for example, Canterbury is dryer than the West Coast because of the influence of the Southern Alps. Places build and adapt to their own normal rainfall, so it can take less rain to overwhelm a drier region than a wetter one.

We should expect increasingly frequent, intense extreme rainfall in future

The wettest days in New Zealand are projected to become wetter. Projections for 2070–2099 suggest that extreme rainfall will be more intense, more frequent, and affect wider areas.

Large areas of New Zealand are projected to experience multiple massive, multi-region, multi-day rainfall events with the potential to cause devastating impacts. Some individual modelled future events resemble or surpass the most devastating past storms, such as 1988's Cyclone Bola and the 1923 Canterbury storm, and affect over 10% of New Zealand's land area simultaneously.

Under a moderate emissions pathway, in which global warming reaches about 2.7°C above pre-industrial levels, more than half the country could experience at least a 50% increase in the frequency of rainfall events that we currently expect to occur about once a decade. Around 30% of places could see a doubling, and roughly 10% could experience three times as many events. That means for some parts of New Zealand, rainfall events that used to return roughly once a decade could happen every two or three years by the end of the century.

Even in a typical year, the most intense three-day rainfall events – often involving totals of hundreds of millimetres of rain – are projected to be wetter, dropping around 4% to 15% more rain than the historical average (1985–2014).

Models consistently showed greater rainfall intensification in the central North Island and western South Island, and the strongest increases in precipitation were projected for the northern North Island and southern South Island.

The extent of this change depends on future emissions, with larger increases under higher greenhouse gas scenarios. However, random variability is large enough that some areas will still be "lucky" even in a warmer world; despite overall increases in rainfall extremes under climate change, 20–30% of New Zealand's areas will have experienced their most extreme event in the past.

WHAT YOU MIGHT HEAR PEOPLE SAY ABOUT THIS

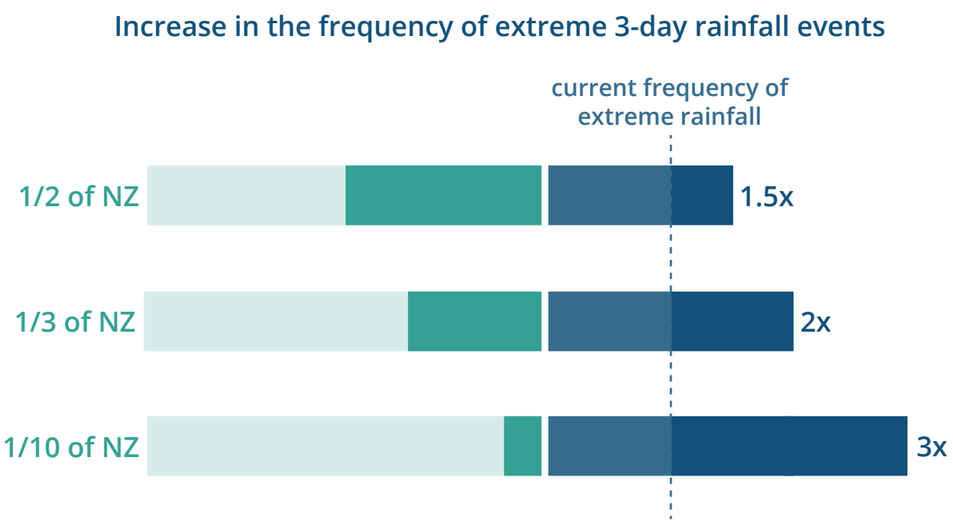
"This research isn't based on real observations. Models aren't reality."

Models are simplifications of reality, and they cannot give exact predictions or account for every possible variable. However, they allow us to run experiments that are otherwise impossible, like simulating thousands of years of plausible New Zealand weather to anticipate extreme events that haven't happened yet, but could.

The physics used by these models is based on millions of real observations taken over the past seven decades, including sea surface temperatures and the composition of the atmosphere. Six independent models used in this research all project more frequent extreme rainfall over most of New Zealand, and multiple independent research teams have reached consistent conclusions.

One-third of New Zealand is projected to experience twice as many impactful rainfall events

Increase in 3-day extreme rainfall events (which occur about once per decade in the recent past) by 2070–2100 (relative to 1985–2014) under a middle-of-the-road (SSP2-4.5) emissions scenario based on six downscaled CMIP6 models.



Auckland Anniversary Weekend Floods, 27 January 2023. Yosuke Tanaka / iStockPhoto

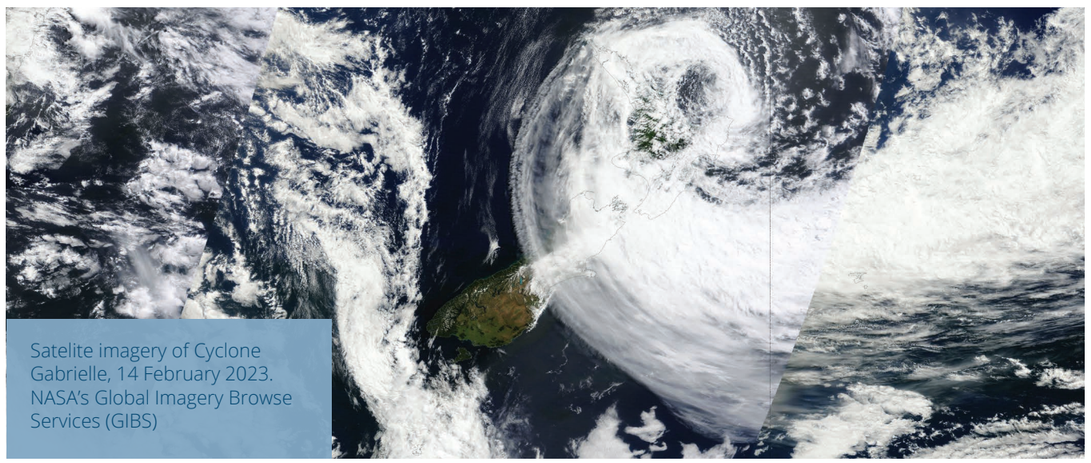
What this means for decision-makers

This research found that the range of plausible future rainfall events is much larger than our short-term historical records suggest. This creates a major challenge in planning for extreme rainfall in future. It means that even careful, evidence-based planning may result in under-preparation, because our observed evidence base is too short to represent the full range of what is possible.

Community perception of risk also tends to be based on living memory, which may affect social licence for adaptation measures based on a better assessment of risk. Additionally, this research gives us improved understanding of, and usually lower confidence in, return period estimates ("one-in-N-year storm") that are often used to communicate risk to communities.

We are confident the frequency and intensity of extreme rainfall will increase under climate change. This means decision-makers must plan for extreme rainfall despite uncertainty and increasing variability (while doing all we can to prevent worsening climate change).

Two approaches are recommended: adaptation measures for increasingly frequent extreme rainfall events, and building emergency and financial resilience for rare, catastrophic events.



Satelite imagery of Cyclone Gabrielle, 14 February 2023. NASA's Global Imagery Browse Services (GIBS)

Adaptable, frequent events and *catastrophic, rare* events require different approaches

It may be useful for planning purposes to distinguish between two kinds of extreme rainfall events: adaptable frequent events, and catastrophic rare events. We need to prepare differently for each type of event.

Adaptable, frequent extreme rainfall events already happen several times a century. We need to adapt our policy and infrastructure (including nature-based solutions) to prepare for these, because they are projected to become even more frequent and intense with climate change. By preparing well for these events, we may also soften the impacts of catastrophic rare events.

Catastrophic, rare rainfall events can cause flooding and landslides, and are more like other natural disasters, such as earthquakes, tsunami and volcanic eruptions. Some future record-shattering rainfall events will fall into this category. Physical infrastructure isn't enough to protect people and places from these events. We need to build resilience with land-use planning, well-resourced emergency management services, emergcy response plans, and insurance. Individuals and communities need support to plan what to do ahead of time.

Operation Awhina delivering much needed supplies to the isolated community of Aropaoanui, Hawke's Bay after Cyclone Gabrielle. NZDF

Road damage due to flooding and slip damage near Patoka, Hastings after Cyclone Gabrielle, 17 February 2023, Tania McCauley. Hastings District Libraries 008345. CC BY-NC-ND 4.0

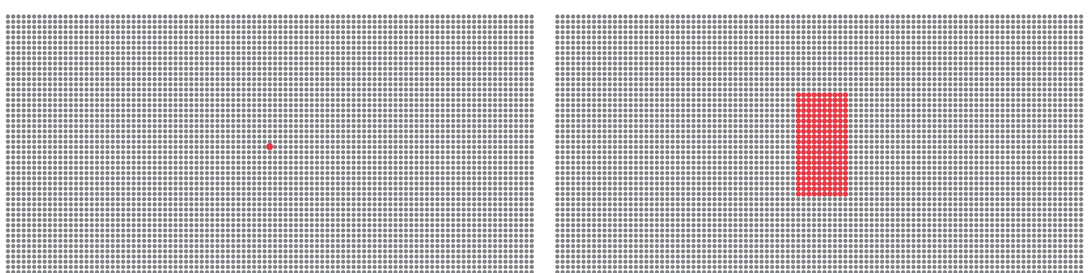
What level of risk should planning decisions tolerate?

Extreme rainfall events in future are projected to exceed historic records. That means infrastructure designed to withstand historic events may not be enough to protect people and property in the future.

However, the wide range of plausible extreme rainfall in future complicates the design of robust adaptation strategies and infrastructure. The annual estimated probability of exceeding the worst-in-century event can vary by a factor of 200 (from 0.02% to 4%). Over a century, the worst rainfall event an area experiences could be half what's statistically expected or more than double it.

That's an extraordinary range of uncertainty for planners to work with, making it difficult to define what level of risk should be planned for. This research provides a framework for simulating future record-breaking rainfall events. We suggest that regional decision-makers consider that record-shattering rainfall events observed elsewhere around the country, particularly in regions with a similar climate, could also happen in their region.

The annual estimated probability of a 'worst in century' event can vary by a factor of 200



1 in 5,000 | 200 in 5,000 (1 in 25)

Man at flooded garage, originally published in the *Bay of Plenty Times,* 10 June 1971. Copyright holder: NZME (New Zealand Media and Entertainment). Te Ao Mārama - Tauranga City Libraries Photo gcc-18226. CC BY-NC 4.0

Short-term rainfall records may lead to under-preparedness

Even when we make careful, evidence-based decisions, we may be under-prepared if we have used an evidence base too short to represent the full range of risk.

Few New Zealand monitoring sites have long rainfall records, so 'unprecedented' rainfall is always measured against a limited history. If the historical record shows relatively mild extremes, it might simply be good luck that more severe rainfall events haven't been experienced yet. If decisions about infrastructure, insurance settings, or land-use rules are based on that record, maladaptive planning for future risk is possible.

This could leave a region dangerously underprepared for future events, potentially resulting in more severe impacts for local communities.

WHAT YOU MIGHT HEAR PEOPLE SAY ABOUT THIS

"Extreme weather is random, so we shouldn't invest in infrastructure that might not be needed."

Randomness means we need to prepare for a range of plausible events, not just the ones we've seen. The physics is well established and backed by decades of observations: a warming atmosphere means more frequent and intense rainfall events. That means we need to adapt our infrastructure.
The Insurance Council of New Zealand has calculated that every $1 invested in flood resilience saves $6 in post-event costs.

We also need emergency management planning for rare but catastrophic rainfall events, similar to how we already plan for natural disasters such as earthquakes, tsunami and volcanoes. New Zealand already invests in preparing for these random, high-consequence events. Wellington hasn't had a major earthquake in modern times, but we don't conclude that therefore no investment in preparation is needed.

Open flood gates in Horowhenua 2015. rghenry / DepositPhotos

Two hypothetical towns

Kāinga Tahi	Kāinga Rua
The Kāinga Tahi District Council's new flood zone maps have not gone down well with Graham, a retired lawyer. At the public meeting, he is convincing: the creek near his property has never flooded in his lifetime, his father's lifetime, or that of anyone he's spoken to. Kāinga Tahi hasn't had an extreme rainfall event in 70 years. The maps feel like bureaucratic overreach. Faced with sustained community opposition, grounded in their lived experience, the council retreats. Planners call it a pragmatic response to local context. Kāinga Tahi's infrastructure will be designed for the rainfall this statistically lucky community has seen, not the rainfall it risks experiencing in future. But the absence of recorded extreme rainfall is not the same as the absence of risk. When Kāinga Tahi's creek floods 10 years later, the community is dangerously underprepared. Homes and businesses are lost.	Mere remembers the flood. The river broke its banks two decades ago, swallowing a bridge and the lower streets of Kāinga Rua. Five children died as floodwaters tore through a school. Mere had to move out of her home for months while silt was cleared. Her family, along with many others, lost their business. The event changed how Kāinga Rua residents thought about rain. Rates were increased to rebuild stopbanks, roads and the bridge, fund new drainage infrastructure, and raise the floor level of public buildings. Home insurance premiums spiked. Families moved away. Many of the people who stayed still experience severe anxiety during rainstorms. But what if that devastating event was a once-in-5000-years outlier? The community is well prepared, but their investment in infrastructure may have been calibrated to the wrong benchmark.

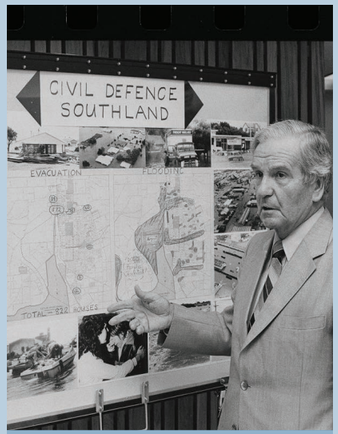
Havelock North, following Cyclone Gabrielle, February 2023, personal goods dumped on the roadside for removal, Mark Palmer. Hastings District Libraries. CC BY-NC-ND 4.0

Our collective perception of risk is biased by recent events

The worst events from living memory shape how we think about risk today. But our collective risk perception can be biased if the worst event in memory was unusually mild or unusually severe compared to the true underlying hazard. If our worst-ever flood was unusually mild, we'll underestimate future risk; if it was unusually severe, we'll overestimate risk.

While experiential knowledge and local stories are valuable for resilience planning, New Zealand's future rainfall extremes will defy living memory. The frequency and intensity of extreme rainfall will increase under climate change, so communities need to prepare for more extreme rainfall than they have experienced in the past.

The potentially broad gap between actual statistical risk and the worst event a community can remember has implications for how likelihood is communicated to communities. It also complicates planning: this recency bias may affect social licence for planning based on true risk, community willingness to invest in adaptation measures and infrastructure, and household preparedness for emergencies.



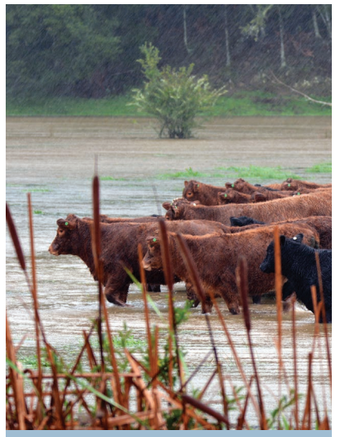
Minister of Internal Affairs, Alan Highet, showing the effects of floods in Southland, 1984, Stuart Ramson for the *Dominion Post*. Alexander Turnbull Library 22829053

What level of risk should emergency management prepare for?

Because the range of plausible extreme rainfall events is greater than our historical record captures, if emergency management planning is based only on those records we may be under-preparing for the flooding and landslides associated with extreme rainfall.

Our current flood maps are informed by our short historical record, with projections under different climate scenarios also informed by those same benchmarks. Therefore, this research implies that flood maps may under-represent the full range of plausible future rainfall events.

This research provides a framework for simulating future record-breaking rainfall events, to help us understand how natural hazards might manifest under a warming climate, with potential applications for emergency management planning and stress-testing regional flood resilience measures.



Kawakawa, Northland, cows trapped in a flooded field after catastrophic record-breaking storm, 8–12 July 2014. Chameleonseye / iStockPhoto

The risk of extreme rainfall events is increasing and hard to predict

Extreme rainfall events occur randomly and irregularly, by chance – but the underlying risk of a record-shattering event is increasing. As the climate warms, extreme rainfall is expected to get more intense (by roughly 5%–12% per degree of warming, based on cited research).

Our natural rainfall variability is already high. Even without climate change, a worst-in-century event could range from under 70% to over 200% of what's statistically expected. Under climate change, that range is projected to widen further. Day to day, we experience climate change as an increasingly variable climate, and that variability is more important for planning than shifts in long-term averages.

This has consequences for risk assessments, design standards, and adaptation planning based on observational records or limited-length model simulations. Better separating natural variability from the warming signal in the record would help give a clearer sense of how representative our observed extremes really are.

WHAT YOU MIGHT HEAR PEOPLE SAY ABOUT THIS

"My house has been here for 70 years and never flooded."

People often use the most extreme event in living memory as a benchmark for what is plausible in the future. But the worst event in memory may be unusually mild (or unusually severe) compared to the true underlying hazard. Not being able to identify past flooding tells us your area has been relatively lucky over recent history, not that the risk of flooding is genuinely low. Events beyond memory aren't beyond possibility.

WHAT YOU MIGHT HEAR PEOPLE SAY ABOUT THIS

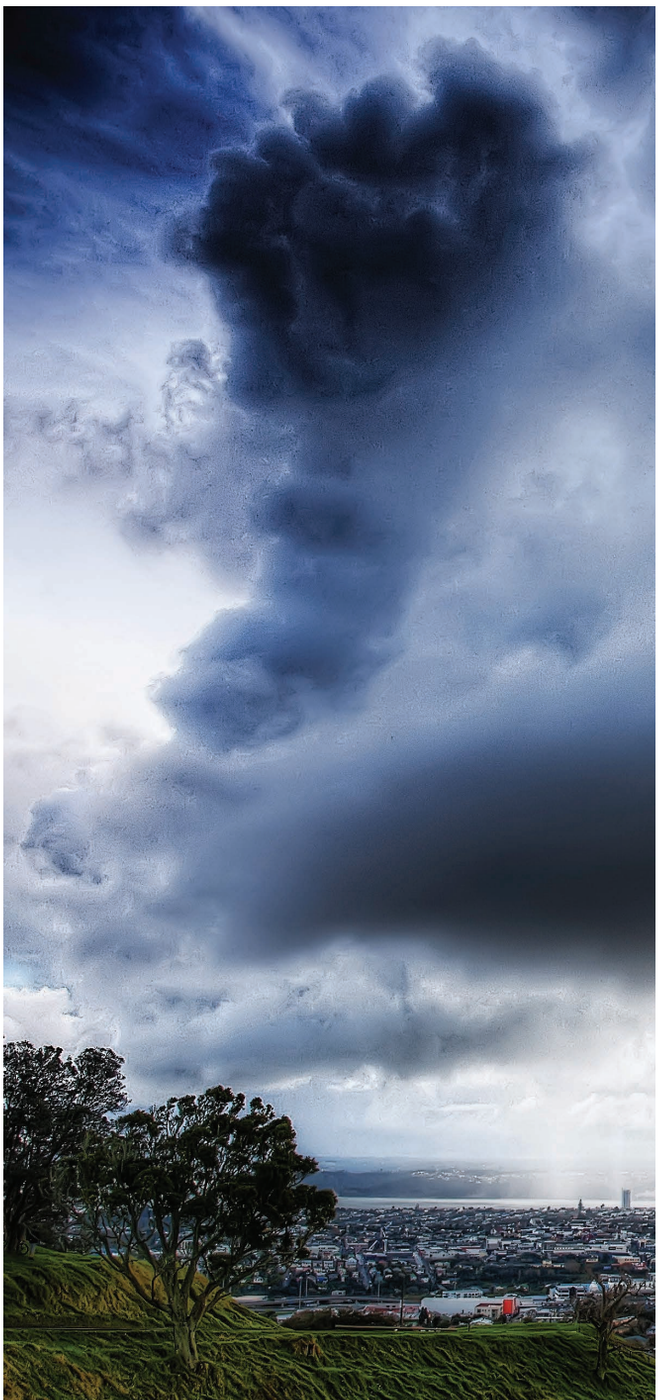
"If rainfall has always been unpredictable, why blame climate change?"

Our high natural climate variability is why a trend is hard to spot in any single weather station's short record. That doesn't change the global situation: a warmer atmosphere holds more moisture, so the heaviest downpours get heavier. The problem is that high variability can obscure that rising risk. A run of 'lucky' decades can hide it, until a record-shattering event arrives.

Dr Luke Harrington leads the Climate Extremes and Societal Impacts research group at The University of Waikato, Te Whare Wānanga o Waikato. His research focuses on how extreme weather events respond to a warming climate, and why this matters for communities and decision-makers. He was the recipient of the New Zealand Meteorological Society's Kidson Medal in 2022 and the 2025 Prime Minister's MacDiarmid Emerging Scientist Prize

Dr Luke Harrington
Senior Lecturer in Climate Change
University of Waikato
Te Aka Mātuatua - School of Science
Te Wānanga Pūtaiao - Division of Health, Engineering, Computing and Science
luke.harrington@waikato.ac.nz
www.waikato.ac.nz

Climate Extremes & Societal Impacts
THE UNIVERSITY OF WAIKATO



Mt Eden, Auckland, before extreme rainfall, 17–18 July 2015. Lukas Bischoff / iStock