

# Climate Change & Risk Management

James Hughes



# Agenda

- Climate context
- National / global focus on risk & resilience
- Liability and responsibility
- The NCCRA
- Assessing climate risk
- Adaptation considerations
- Climate risk governance
- Reflections and closing thoughts

## The Rodney & Otamatea Times

WAITEMATA & KAIPARA GAZETTE.

PRICE—10s per annum in advance

WARKWORTH, WEDNESDAY, AUGUST 14, 1912.

3d per Copy.

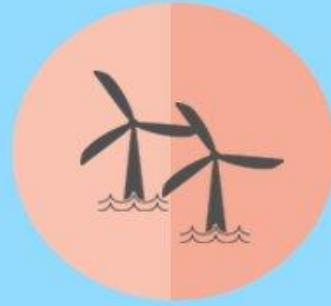
### Science Notes and News.

#### COAL CONSUMPTION AFFECTING CLIMATE.

The furnaces of the world are now burning about 2,000,000,000 tons of coal a year. When this is burned, uniting with oxygen, it adds about 7,000,000,000 tons of carbon dioxide to the atmosphere yearly. This tends to make the air a more effective blanket for the earth and to raise its temperature. The effect may be considerable in a few centuries.

# Climate change context

# Language



## MITIGATION

Efforts to reduce or prevent emission of heat-trapping gases.

### Example:

Transition toward renewable energy, reduce deforestation etc.



## ADAPTATION

Action that helps cope with the effects of climate change.

### Example:

New barriers to protect against rising sea-levels.

*“We must plan for a 4 degree world, while aiming for a 1.5 degree world”.*

*C40 Cities*

ipcc

INTERGOVERNMENTAL PANEL ON climate change

# Climate Change 2021

## The Physical Science Basis

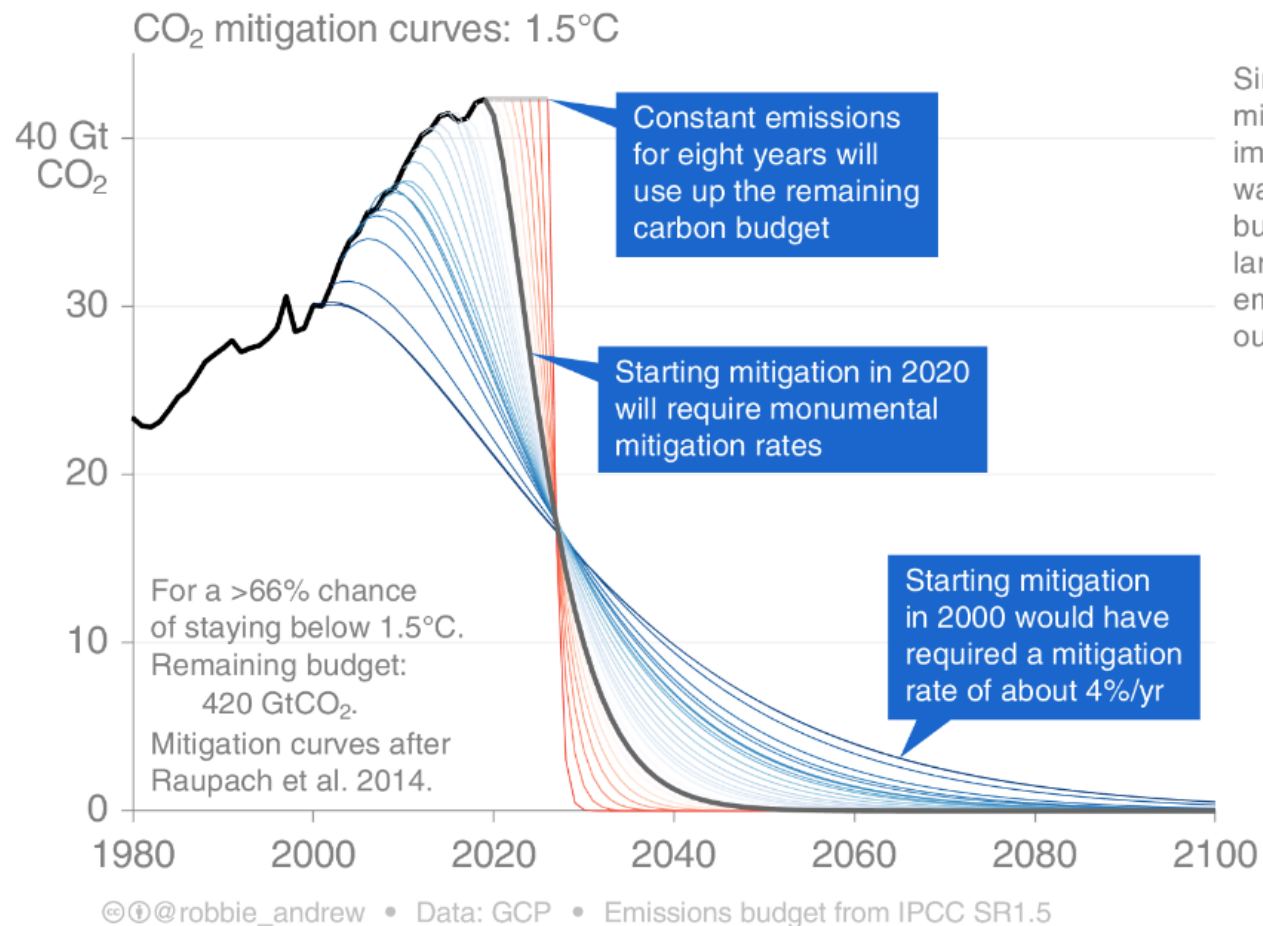
Summary for Policymakers



WGI

Working Group I contribution to the  
Sixth Assessment Report of the  
Intergovernmental Panel on Climate Change



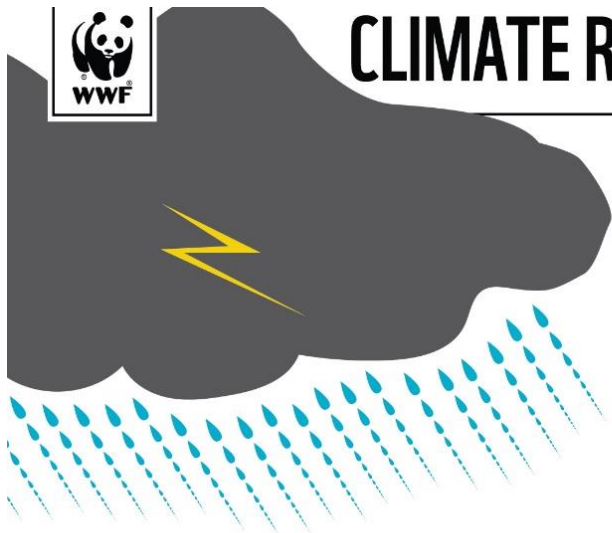


Since such steep mitigation is impossible, the only way to achieve this budget is with very large "negative" emissions: pulling CO<sub>2</sub> out of the atmosphere.

# Urgency



# CLIMATE RISKS: 1.5°C VS 2°C GLOBAL WARMING



## EXTREME WEATHER

**100%** increase in flood risk. | vs | **170%** increase in flood risk.

## SPECIES

**6%** of insects, **8%** of plants and **4%** of vertebrates will be affected. | vs | **18%** of insects, **16%** of plants and **8%** of vertebrates will be affected.

## WATER AVAILABILITY

**350 million** urban residents exposed to severe drought by 2100. | vs | **410 million** urban residents exposed to severe drought by 2100.

## ARCTIC SEA ICE

Ice-free summers in the Arctic at least once **every 100 years.** | vs | Ice-free summers in the Arctic at least once **every 10 years.**

## PEOPLE

**9%** of the world's population (700 million people) will be exposed to extreme heat waves at least once every 20 years. | vs | **28%** of the world's population (2 billion people) will be exposed to extreme heat waves at least once every 20 years.

## SEA-LEVEL RISE

**46 million people** impacted by sea-level rise of 48cm by 2100. | vs | **49 million people** impacted by sea-level rise of 56cm by 2100.

## OCEANS

Lower risks to marine biodiversity, ecosystems and their ecological functions and services at 1.5°C compared to 2°C.

## CORAL BLEACHING

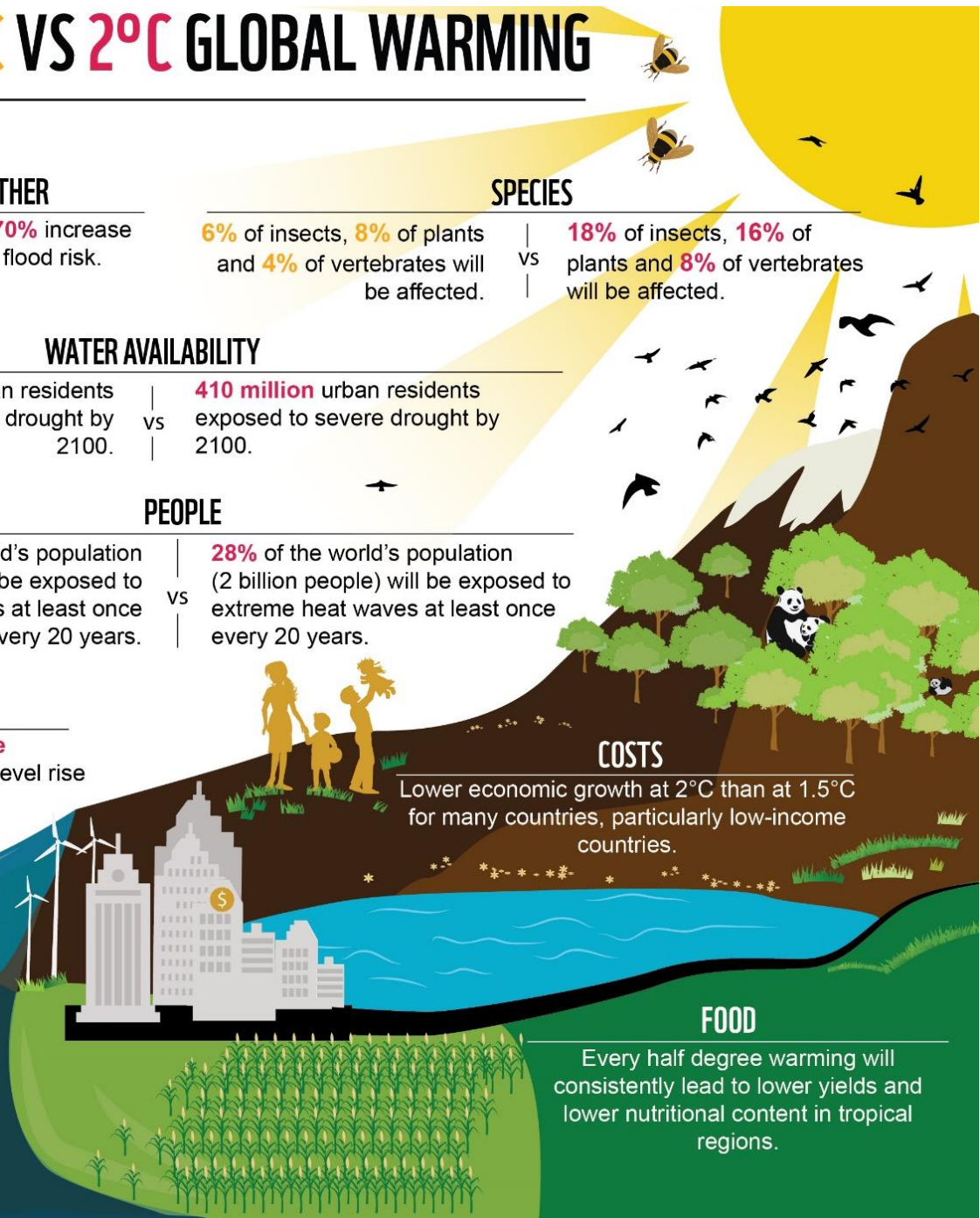
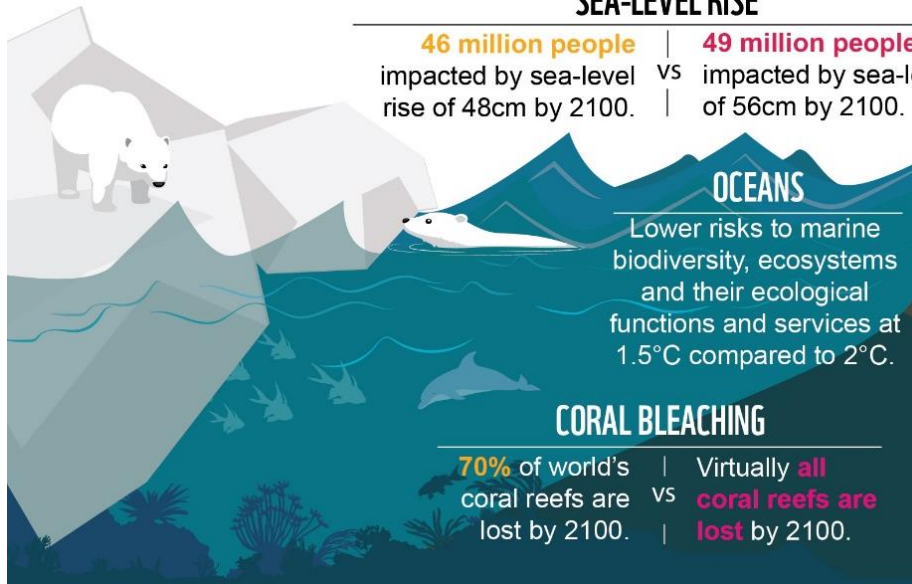
**70%** of world's coral reefs are lost by 2100. | vs | Virtually **all coral reefs are lost** by 2100.

## COSTS

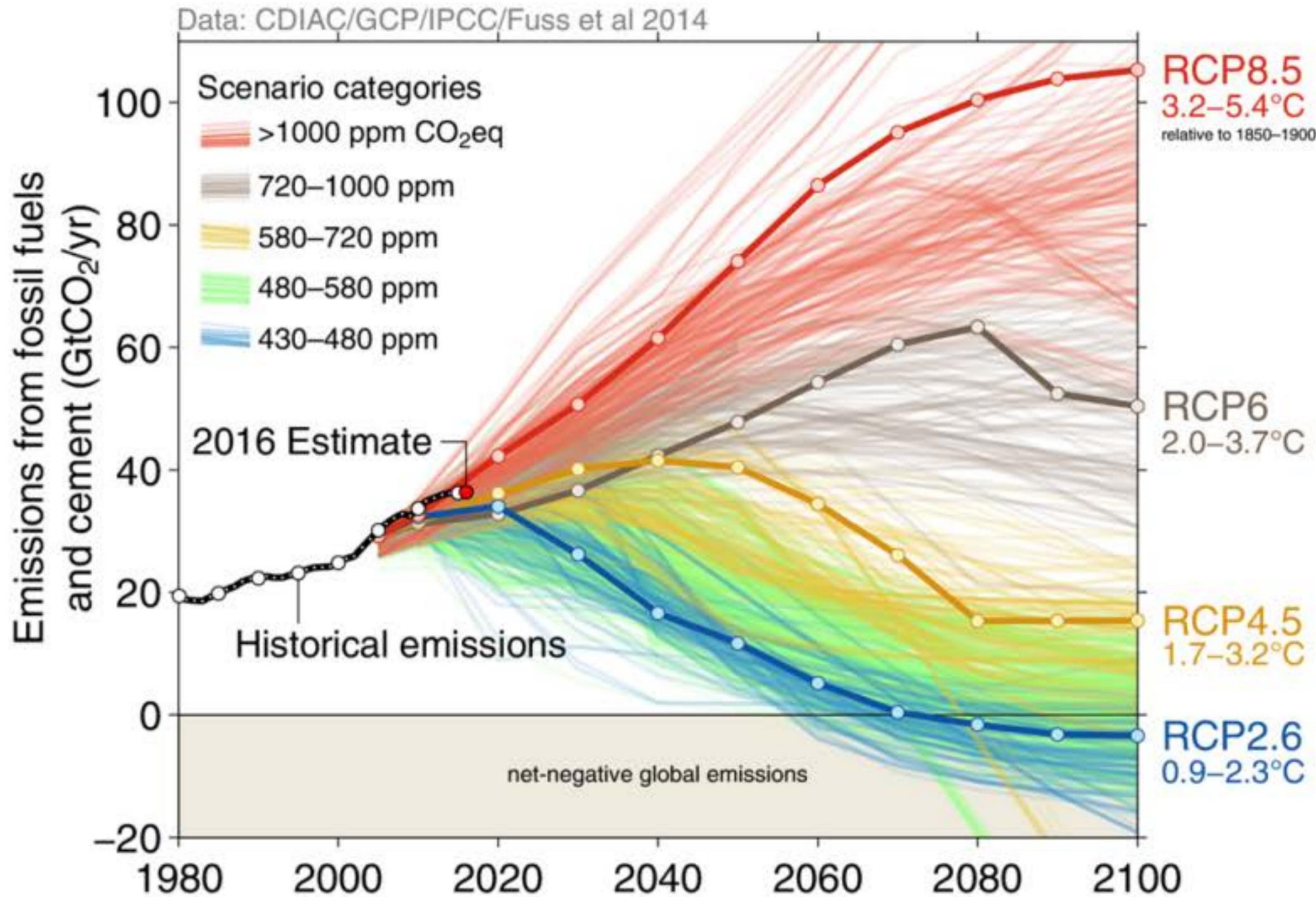
Lower economic growth at 2°C than at 1.5°C for many countries, particularly low-income countries.

## FOOD

Every half degree warming will consistently lead to lower yields and lower nutritional content in tropical regions.

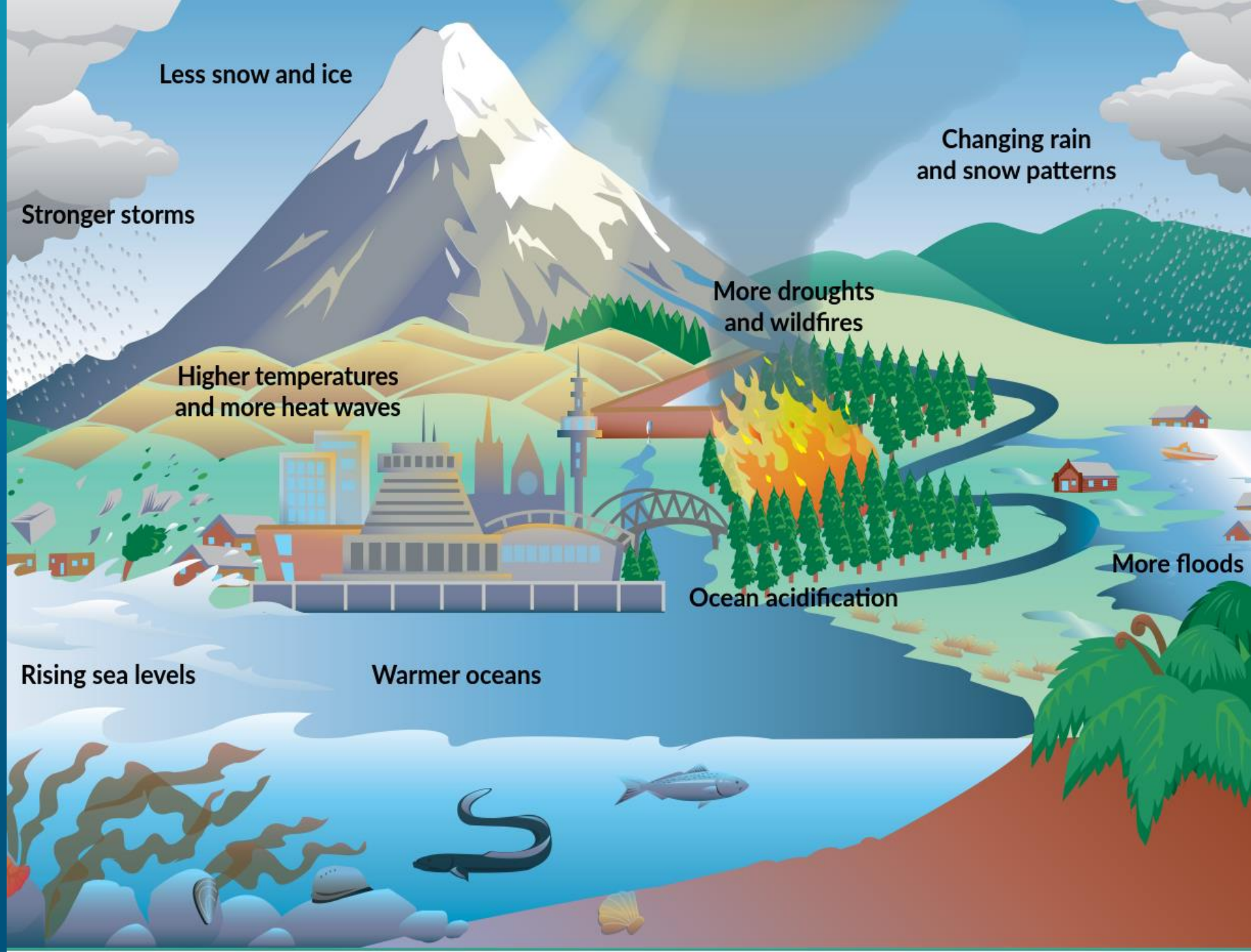


# Uncertainty

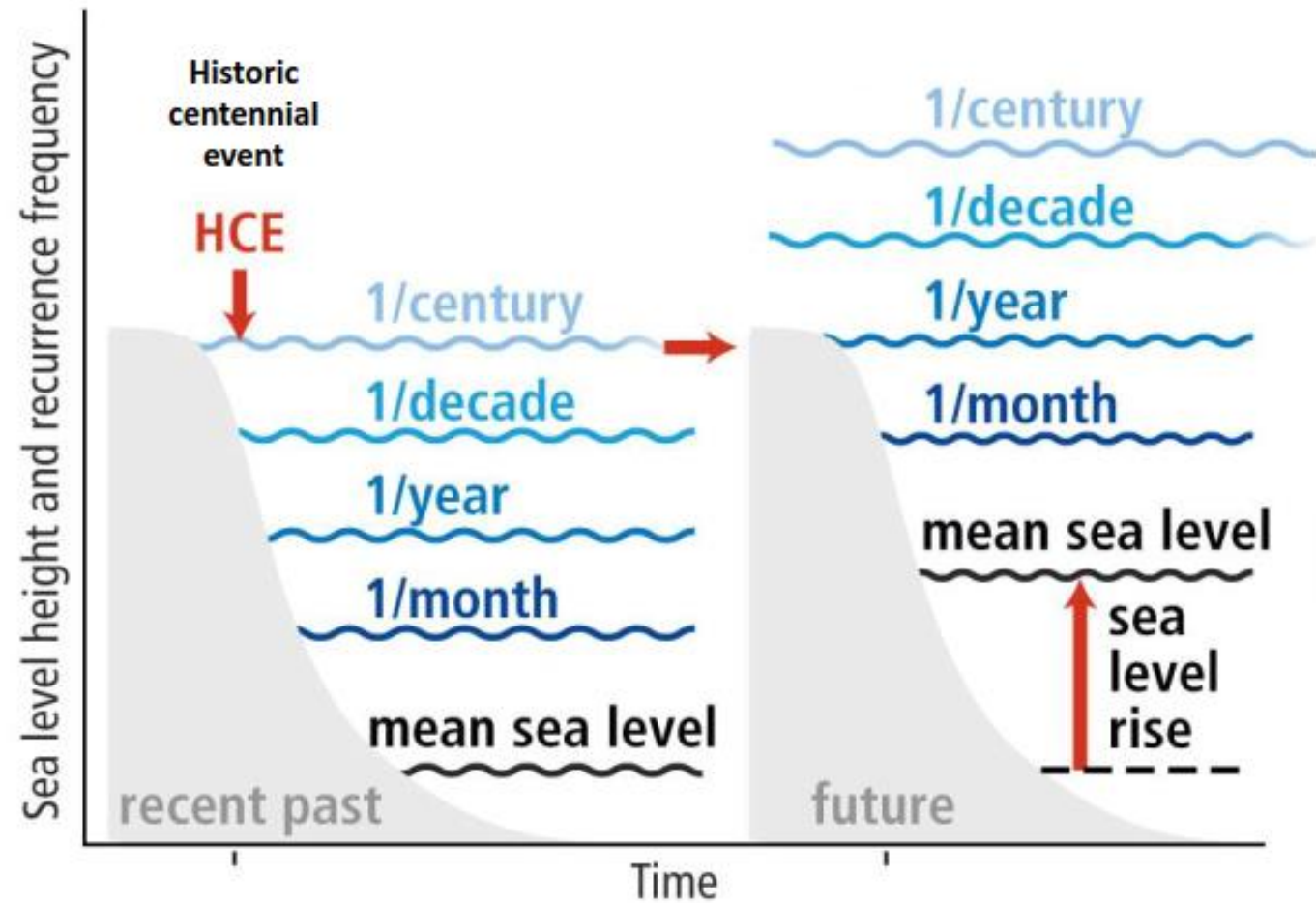




# Hazards



# Hazards



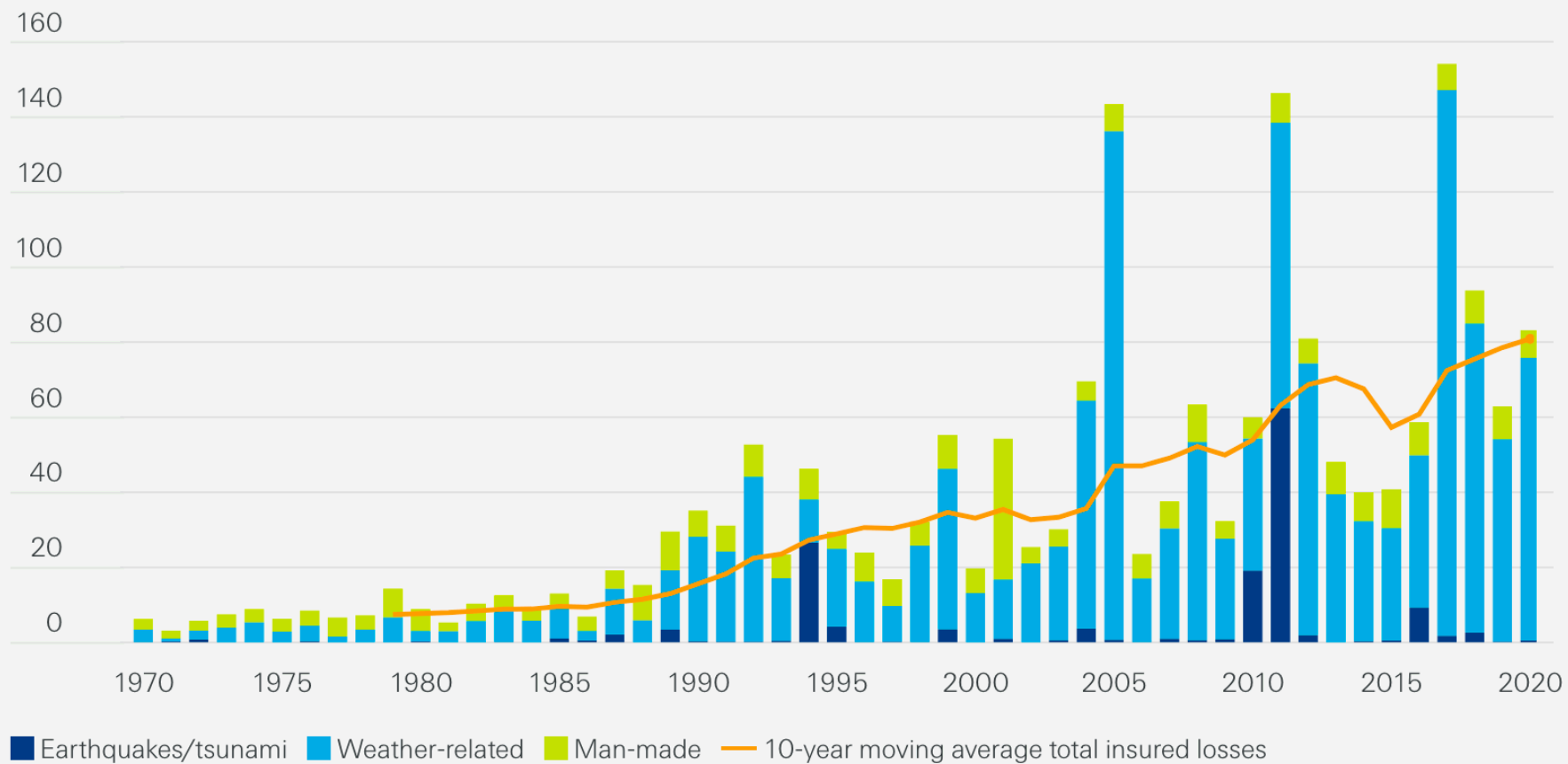
*Special Report: Oceans & Cryosphere-IPCC (Sept 2019)*

*For NZ, change in frequency from  
1/century to 1/year*

- *After modest SLR of 30-45cm*
- *Occurs from mid century onwards*

*Source: Rob Bell, NIWA*

Insured losses, 1970–2020, in USD billion at 2020 prices



Source: Swiss Re Institute


Tonkin+Taylor

# Global natural hazard events

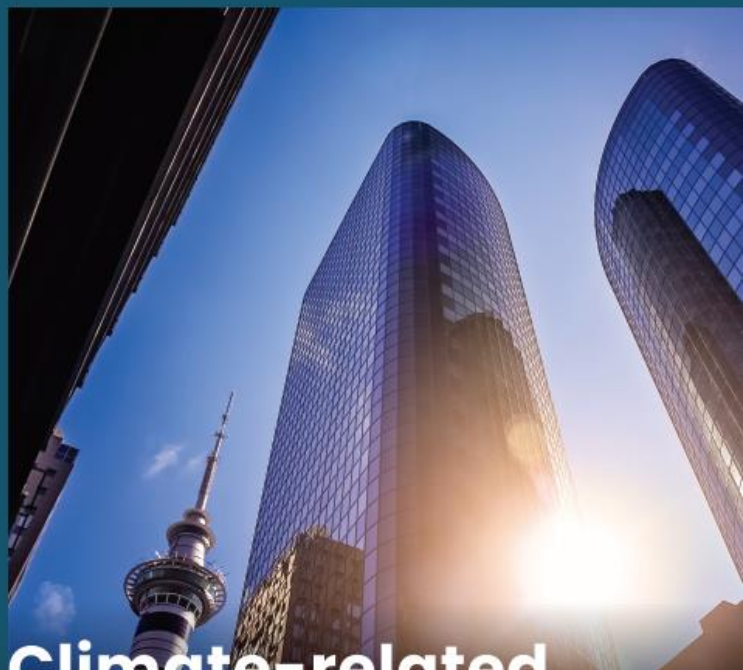
# Is **unprecedented** the new normal?

- ICNZ: Mean annual loss of \$150M 2013-2018
- What about uninsured?
- Droughts alone cost \$720M in economic losses from 2007 to 2017
- ICNZ: 2021 loss estimate \$180M+!



Date	↕	Event	↕	Categories	↕	Cost (\$m)	↕	Inflation adjusted cost (\$m)	↕	More info	↕
2021 Jul 16 - 19		West Coast Flooding		Flood		85.41*					
2021 Jul 16 - 19		Upper South Island Floods		Flood		16.72*					
2021 Jul 16 - 19		Wellington Floods		Flood		15.36*					
2021 Jul 16 - 19		North Island (excluding Wellington) Floods		Flood							
2021 Jun 19		South Auckland Tornado		Tornado		32.03*					
2021 May 29 - Jun 1		Canterbury Flooding		Flood		43.81*					
2021 Jan 2 - 3		Canterbury Southwards Rain and Hailstorm		Hail, Rain, Storm		3.84					

National / global focus on climate,  
liabilities



# Climate-related financial disclosures

UNDERSTANDING YOUR BUSINESS RISKS AND OPPORTUNITIES RELATED TO CLIMATE CHANGE

Discussion document



New Zealand Government



## Adaptation preparedness: 2020/21 baseline

A summary of reporting organisation responses to the first information request under the Climate Change Response Act 2002



New Zealand Government



## National Climate Change Risk Assessment for New Zealand

Arotakenga Tūraru mō te Huringa Āhuarangi o Āotearoa

Snapshot  
Whakarāpopotonga



New Zealand Government



CONTROLLER AND AUDITOR-GENERAL  
Tumuaki o te Mana Arotake

CLIMATE  
CHANGE  
COMMISSION



## Offences

### 461ZC Offence to knowingly fail to comply with climate standards

- (1) A climate reporting entity and every director of the entity commit an offence if—
  - (a) any of the following fail to comply with an applicable climate standard:
    - (i) the climate statements of the entity prepared under **section 461W**;
    - (ii) **group climate statements** in relation to a group comprising the entity and its subsidiaries prepared under **section 461X**;
    - (iii) the climate statements or group climate statements prepared by the entity under **section 461Y**;
    - (iv) in the case of a manager of a registered scheme, the climate statements for any separate fund or for the scheme prepared under **section 461Z**;
    - (v) the document prepared by the entity under **section 461ZB** or the determination made by the entity under **section 461ZA** to which the document relates; and
  - (b) the entity or the director (as the case may be) knows that the climate statements or group climate statements fail, or the document or determination fails, to so comply when those statements are, or when that document is, lodged.
- (2) A person who commits an offence under **subsection (1)** is liable on conviction,—
  - (a) in the case of an individual, to **imprisonment** for a term not exceeding **5 years**, a fine not exceeding \$500,000, or both; and
  - (b) in any other case, to a fine not exceeding **\$2.5 million**.

## NEW ZEALAND / LOCAL DEMOCRACY REPORTING

# Climate change activists' Mill Rd legal challenge 'a sign of things to come'

8:44 am on 27 March 2021

Share this     

Stephen Forbes, Local Democracy Reporter  
[steve.forbes@stuff.co.nz](mailto:steve.forbes@stuff.co.nz)

Auckland councillor Chris Darby says a legal challenge against the \$1.4 billion Mill Road project by climate change advocates All Aboard Aotearoa is a sign of what's to come.



# Responsibilities and liabilities

## LAWYERS FOR CLIMATE ACTION NZ

Website: [www.lawyersforclimateaction.nz](http://www.lawyersforclimateaction.nz)  
Email: [admin@lawyersforclimateaction.nz](mailto:admin@lawyersforclimateaction.nz)

Committee members: Jenny Cooper GC (President) / James Eversy Palmer GC (Treasurer) / Sophie Moore (Secretary) / Carol Weaver / Tania Te Whenua / Duncan Ballinger / Michael Sharp / Lloyd Kavanagh / Zoe Brentnall / Cassandra Kenworthy /

23 August 2021

Pat Dougherty  
Chief Executive  
Nelson City Council  
PO Box 645  
Nelson, 7040

Dear Pat

### Re: Decision to develop Elma Turner Public Library

1. Lawyers for Climate Action NZ Inc was approached by Zero Carbon Nelson Tasman in July 2020 and again more recently regarding Nelson City Council's decision to develop the Elma Turner Public Library (Library) on a site near the Maitai River.
2. The decision was made at a Council meeting on 18 February 2021 and is reflected in the Long-Term Plan adopted in June 2021. The proposed development is an area that is expected to be at an increased risk of flooding and coastal inundation due to the effects of climate change in the coming decades.
3. Zero Carbon Nelson Tasman's concern is that the Council has failed to properly sequence the Library decision with adaptation decisions in relation to the Maitai floodplain which might include protection measures and/or managed retreat.
4. These will be difficult issues for the Nelson community to address. However, they cannot be side-lined from the decision to develop the Library. In particular:
  - 4.1. the Library development decision could be seen as predetermining the adaptation strategies by excluding managed retreat from this area;
  - 4.2. at a minimum, the Library development decision will be a finger on the scales against managed retreat even though this might be the option that would minimise the long term costs for ratepayers; and
  - 4.3. if managed retreat is ultimately the favoured option, then ratepayer expenditure on the Library development in this location may need to be written off.
5. Accordingly, Zero Carbon Nelson Tasman considers that the Council's consultation and decision-making in relation to the Library development may have breached both the Local Government Act 2002 (LGA) and the Council's commitments under its Declaration of a Climate Emergency dated 16 May 2019.
6. In particular, the Library development decision was taken:
  - 6.1. without regard to the proper sequence of first taking a decision on the appropriate climate change adaptation response in the Maitai floodplain before committing to Library development in an at-risk site;
  - 6.2. without transparency as to the options for the response to climate change induced flood risk and sea level rises, and as to the costs and benefits of those options;
  - 6.3. without considering the costs and benefits of different sites in detail, including in light of climate change induced risks; and
  - 6.4. without discharging obligations to consult with and be accountable to the community.

# The NCCRA



# NCCRA – an overview

- New Zealand's first National Climate Change Risk Assessment
- Provides picture of how New Zealand may be affected by climate change-related hazards
- Enables Government to prioritise actions
- Govt currently developing the NAP

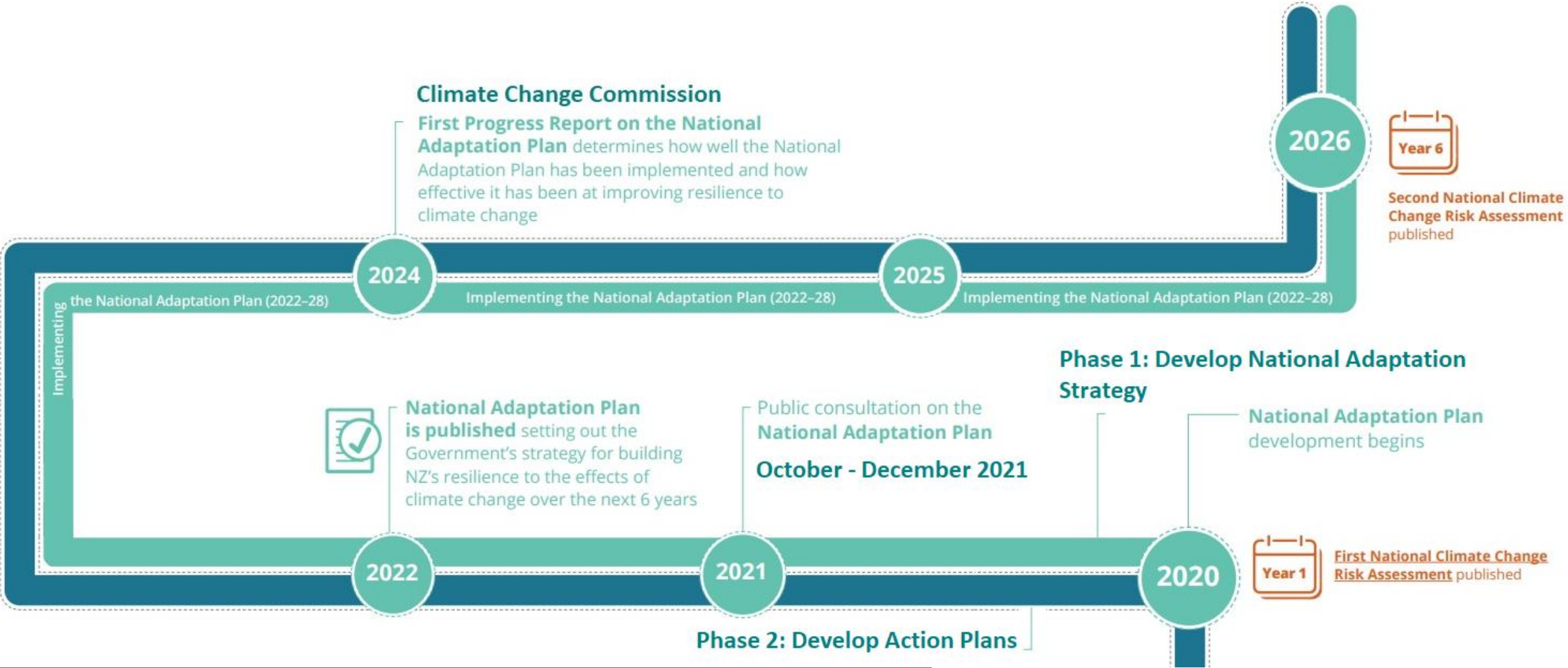
## National Climate Change Risk Assessment for New Zealand

Arotakenga Tūraru mō te Huringa  
Āhuarangi o Āotearoa

Main report  
Pūrongo Whakatōpū



# Adaptation plan process



# Headline risks

## Natural environment

Coastal + indigenous ecosystems

## Human

Social cohesion + wellbeing

Exacerbating + creating new inequities

## Economy

Governments economic costs

Financial system instability

## Built environment

Potable water supplies

Buildings and communities

## Governance

Maladaptation across all domains

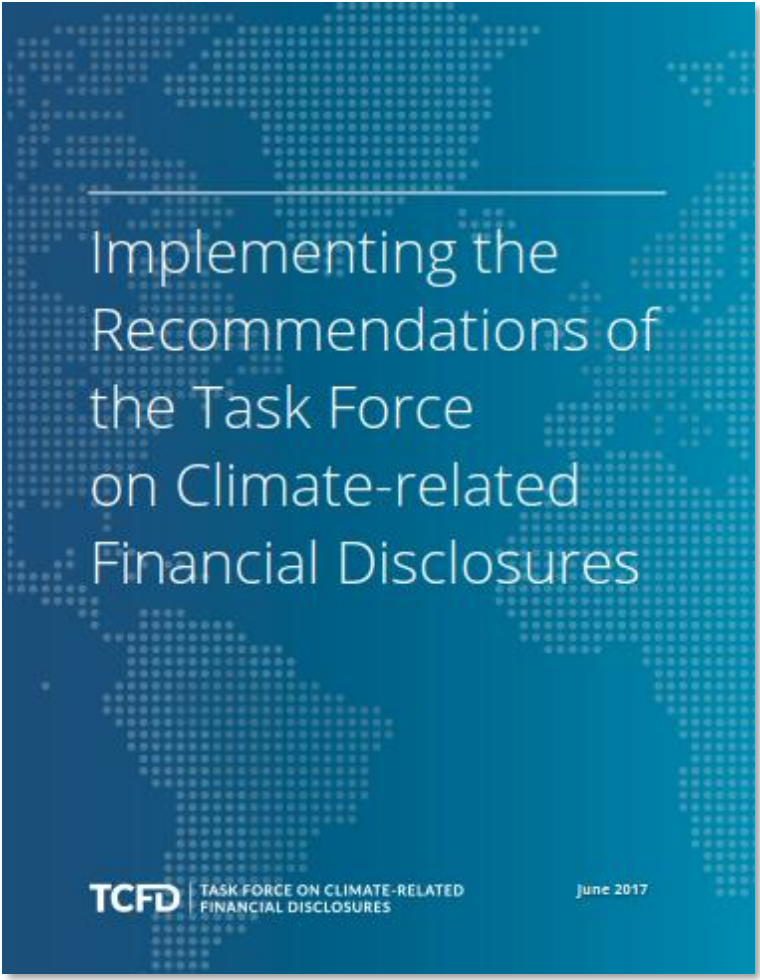
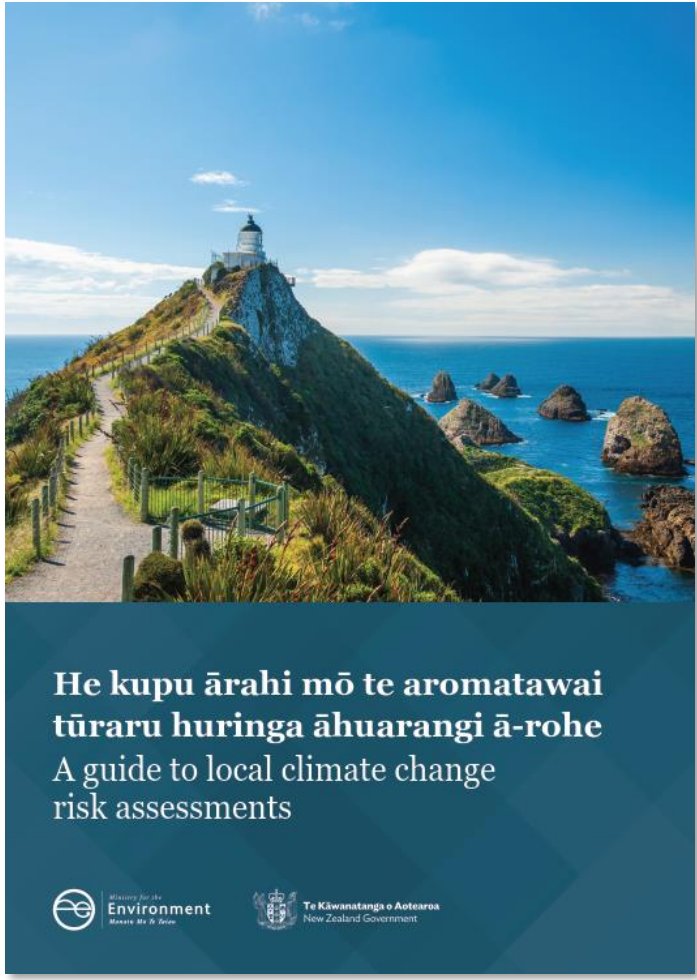
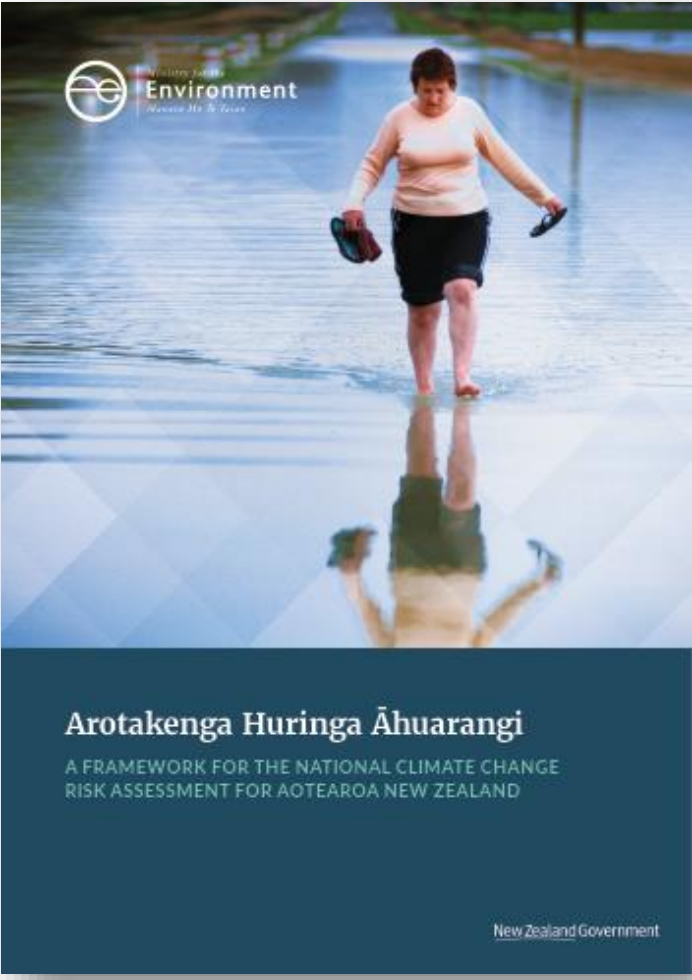
Institutional arrangements not fit for purpose  
or co-ordinated

Built Environment Risk	Risk Rating		
	Now	2050	2100
B1 Risk to <b>potable water supplies</b> (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise.	Major	Extreme	Extreme
B2 Risks to <b>buildings</b> due to extreme weather events, drought, increased fire weather and ongoing sea-level rise.	Major	Extreme	Extreme
B3 Risks to <b>landfills and contaminated sites</b> due to extreme weather events and ongoing sea-level rise.	Mod	Major	Major
B4 Risk to <b>wastewater and stormwater systems</b> (and levels of service) due to extreme weather events and ongoing sea-level rise.	Major	Extreme	Extreme
B5 Risks to <b>ports</b> and associated infrastructure due to extreme weather events and ongoing sea-level rise.	Min	Mod	Major
B6 Risks to linear <b>transport networks</b> due to changes in temperature, extreme weather events and ongoing sea-level rise.	Major	Major	Extreme
B7 Risk to <b>airports</b> due to changes in temperature, wind, extreme weather events and ongoing sea-level rise.	Major	Major	Extreme
B8 Risks to <b>electricity infrastructure</b> due to changes in temperature, rainfall, snow, extreme weather events, wind and increased fire weather.	Mod	Mod	Major

# NCCRA Built Env Risks



# Assessing climate risk



# Guidance

Phase	Step	Groups	Outputs	Resources
<b>Phase 1</b> <i>Getting started</i>	<b>Step 1a</b> Establish project team (including iwi/Māori representatives), governance, and communication plan	Core project team, governance group, and technical reference group		
	<b>Step 1b</b> Establish the project principles, purpose, and level of the assessment		→ Agreed principles	
	<b>Step 1c</b> Planning for iwi/Māori and other stakeholder engagement		→ Engagement plan	
<b>Phase 2</b> <i>Setting up the risk assessment</i>	<b>Step 2a</b> Inputs needed and scale of assessment	Core project team and technical reference group		
	<b>Step 2b</b> Climate change scenarios and time horizons		→ Agreed climate change scenarios and timeframes	
	<b>Step 2c</b> Develop and agree organising themes		→ Agreed organising themes	

<b>Phase 3</b> <i>Undertaking the risk assessment</i>	<b>Step 3a</b> Risk identification and screening <i>(high-level assessment can conclude here)</i>	Core project team, specialists, technical reference group, subject matter experts, stakeholders, and GIS data analysts	→ Screening database	→ <ul style="list-style-type: none"><li>• Hazards list (Appendix A)</li><li>• Risk screening template (Appendix B)</li><li>• Survey (Appendix C)</li></ul>
	<b>Step 3b</b> Detailed risk assessment		→ Draft risk rating workbook → Summary of community inequities and information gaps	→ <ul style="list-style-type: none"><li>• Risk assessment template (Appendix D)</li></ul>
	<b>Step 3c</b> Additional analysis (optional): • consequence rating • opportunities • geospatial analysis to inform risk assessment		→ Opportunities database → Geospatial maps	
	<b>Step 3d</b> Risk rating workbook review		→ Final risk rating workbook	
<b>Phase 4</b> <i>Next steps</i>	<b>Step 3e</b> Risk assessment report	Core project team, technical reference group, and governance group	→ Draft and final technical reports → Public facing report	→ <ul style="list-style-type: none"><li>• Example table of contents (Appendix E)</li></ul>
	<b>Step 4a</b> Risk prioritisation <i>(led by governance group)</i>			
	<b>Step 4b</b> Adaptation planning			

# New MfE Guidance

# Key points

- Staged approach (identification & screening → detailed rating)
- Multiple time horizons
- Assumptions on use of RCP Scenarios
- Need to use risk 'domains' (incl transition)
- Consider opportunities and risks
- Considers direct and indirect risks

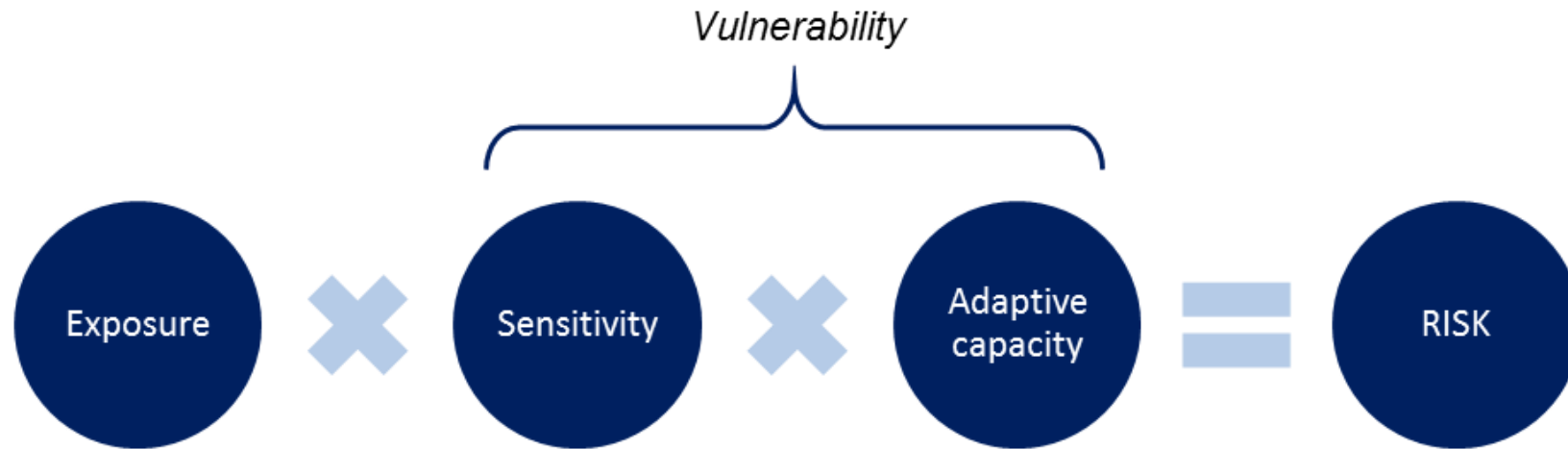


**He kupu ārahi mō te aromatawai  
tūraru huringa āhuarangi ā-rohe**  
A guide to local climate change  
risk assessments





# Process



**Approach**

Select: Coastal Edge Proximity

Select: Coastal Inundation

Select: Surface + River Flooding

Indicative Criticality: 1 2 3 4 5

Surface and River Flooding (Point)

Coastal Edge Proximity (Point)

Coastal Inundation (Point)

X %

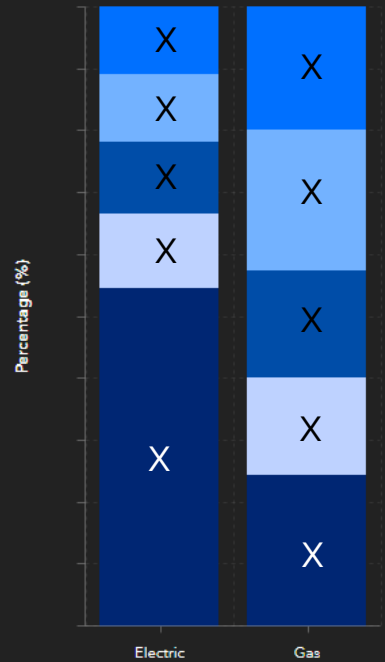
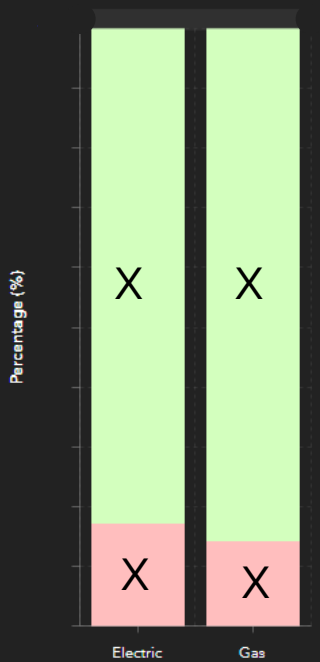
X %

X %

assets exposed (of total)

assets exposed (of total)

assets exposed (of total)



Flood Hazard (Red)  
Not Exposed (Green)

50m (Purple)  
100m (Light Purple)  
150m (Very Light Purple)

0.0m (Dark Blue)  
0.3m (Medium Blue)  
0.6m (Light Blue)  
0.9m (Very Light Blue)  
1.2m (White)

Point Line Polygon



- Asset List- Electric
- Circuit Breaker
- Communication Site
- Power Transformer
- Electric Station
- Generator
- Instrument Transformer
- Load Control Plant
- OH High Tension Electric Line
- UG High Tension Electric Line
- Capacitor Bank
- Distribution Transformer
- Asset List (Gas)
- Regulator Station
- Gas Valve
- CP Rectifier
- Pressure Monitoring Device
- Distribution Main
- Service
- CP Anode
- CP Isolation Point
- Decoupling Device
- CP Rectifier Cable
- Gas Fitting
- Gas Pipe Casing

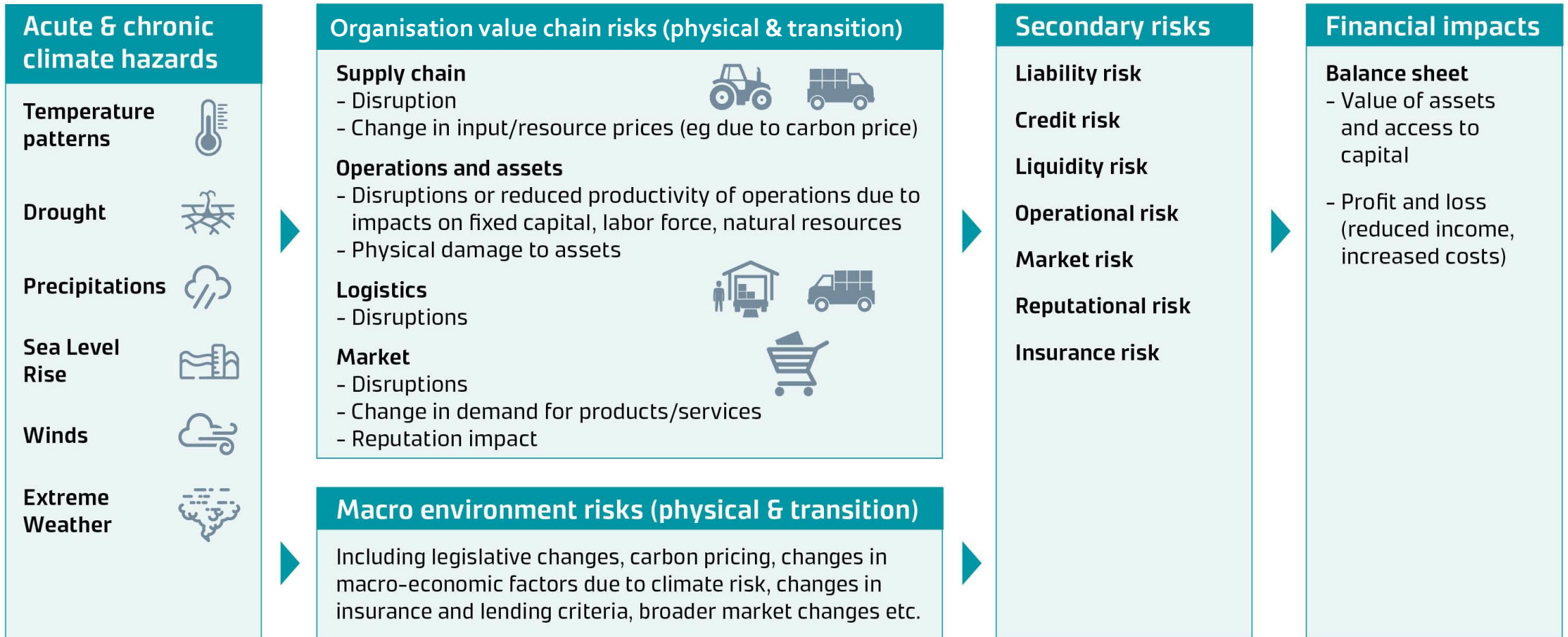
Risk No.	Risk statement	Exposure			Vulnerability				Risk		
					Sensitivity			Adaptive Capacity			
		Present	2040	2090	Present	2040	2090	Constant	Present	2040	2090
B4.1	Risk to wastewater infrastructure due to extreme weather events	M	H	H	H	H	E	M	M	H	E
B4.2	Risk to wastewater infrastructure due to sea level rise and salinity stress	M	H	H	L	H	E	M	L	H	E
B4.3	Risk to wastewater infrastructure due to inland flooding	M	H	H	H	H	E	M	M	H	E
B4.4	Risk to septic tanks due to sea level rise and salinity stress	L	M	H	L	M	M	L	L	M	H
B4.5	Risk to stormwater infrastructure due to extreme weather events	H	H	E	H	H	E	M	H	H	E
B4.6	Risk to stormwater infrastructure due to sea level rise and salinity stress	M	H	H	M	H	E	M	M	H	E
B4.7	Risk to stormwater infrastructure due to inland flooding	H	H	E	H	H	E	M	H	H	E
B4.8	Risk to wastewater treatment plants and their operation due to sea level rise and salinity stress	M	H	E	M	M	H	L	M	H	E
B4.9	Risk to wastewater treatment plants and their operation due to higher temperature	L	L	M	L	L	H	M	L	L	M

Example output



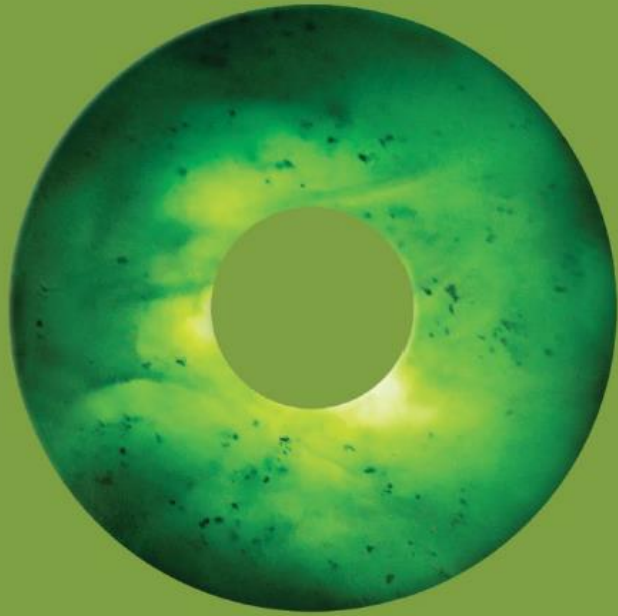
# TCFD – new terminology

# For organisations | Propagation of climate risk



T+T – adapted from CICERO (2017), Shades of climate risk

# Climate risk governance



The  
Aotearoa  
Circle

Mā te Kaitiaki  
he te Tūhono  
Prosperity Through  
Guardianship

Sustainable Finance Forum  
Legal Opinion 2019

- *Climate change is no longer a mere environmental concern: for many, it presents a **material financial risk***
- *Directors and managers must assess and manage climate risk as they would any other financial risk*



# Risk governance – laying the groundwork



Secure support	Secure support of the board of directors and executive leadership team
Integrate	Integrate climate change into key governance processes, enhancing Council oversight through audit and risk committees
Bring together	Bring together sustainability, governance, finance, and compliance colleagues to agree on roles
Financial lens	Look specifically at the financial impact of climate risk and how it relates to revenues, expenditures, assets, liabilities
Assess risk	Assess risk against at least two scenarios
Adapt existing	Adapt existing enterprise-level and other risk management processes to take account of climate risk
Prepare	Prepare the information you report as if it were going to be assured



Level	Networks and cooperation	Leadership and governance	Risk assessment and adaptation planning
<b>1. Starting out</b>	<ul style="list-style-type: none"> <li>No meetings with other councils or stakeholders regarding Climate Change.</li> <li>No working group within council.</li> <li>No public engagement.</li> </ul>	<ul style="list-style-type: none"> <li>Climate change not on the radar.</li> </ul>	<ul style="list-style-type: none"> <li>There is no or limited understanding of infrastructure exposed to climate change.</li> <li>No understanding of risks to communities or to councils finances or reputation etc.</li> </ul>
<b>2. Making progress</b>	<ul style="list-style-type: none"> <li>Some ad-hoc meetings and cooperation beginning to take shape.</li> </ul>	<ul style="list-style-type: none"> <li>Commitment to understand climate exposure and risks.</li> </ul>	<ul style="list-style-type: none"> <li>Risk and vulnerability assessment framework developed and commenced.</li> </ul>
<b>3. Developed</b>	<ul style="list-style-type: none"> <li>Regular cooperation, working groups established.</li> </ul>	<ul style="list-style-type: none"> <li>Climate risks identified and communicated internally and with the public.</li> <li>Adaptation plan developed and signed off.</li> </ul>	<ul style="list-style-type: none"> <li>Risk and vulnerability assessments undertaken, high risks prioritised and options/pathways developed.</li> </ul>
<b>4. Leading</b>	<ul style="list-style-type: none"> <li>Regular cooperation, working groups established across disciplines and stakeholders.</li> <li>Linking to central government direction.</li> <li>Strong integration with civil defence, land use planning, asset planning etc.</li> </ul>	<ul style="list-style-type: none"> <li>Adaptation plan implemented, monitoring and review regularly undertaken.</li> <li>Climate change is a strategic priority that influences all plans and decisions.</li> </ul>	<ul style="list-style-type: none"> <li>Defend/accommodate/retreat options (could be part of a DAPP approach) are developed and implemented via appropriate channels/mechanisms.</li> <li>Risks reviewed and updated regularly.</li> <li>Community are aware and engaged in decision-making - within a robust and transparent process.</li> </ul>

# Exposed: Climate change and infrastructure

Guidance for councils.

August 2019



# Reflections and closing thoughts

ADAPT  
DEFEND  
RETREAT

● 22.06

Opening Wednesday  
June 22, 5:30pm

Cooperative Research Centre  
for Water Sensitive Cities  
Monash Art, Design & Architecture

MADA Gallery  
Building G, Ground Floor  
900 Dandenong Rd  
Caulfield East Victoria 3145  
t +613 9903 2882  
www.artdes.monash.edu

— 07.07

2016

SWAMPED

## Reflections

1. **Embed and integrate** approaches between asset managers, emergency managers, planners, funders – to incorporate climate and natural hazard risk
2. We need to **build and maintain good quality data** - for assets and hazards, to enable evidenced based planning for climate risk (linked with renewals, new capex).
3. Assess where you are 'at' – with respect to **maturity of your organisation**
4. Consider adaptation early, and **look for co-benefits**
5. We need **fluency** in the new language of climate change – incl mitigation, adaptation and 'carbon'.

*“Human civilization is built on the premise that the level of the sea is stable, as indeed it has been for several thousand years”.*

NY Times

