

**AN INSTITUTIONAL FRAMEWORK FOR  
CLIMATE RESILIENCE- FACILITATING  
FLEXIBLE PLANNING AND  
PLANNED RETREAT IN NEW ZEALAND**

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KUSTMÖTET (THE COASTAL  
MEETING) SWEDEN 2022

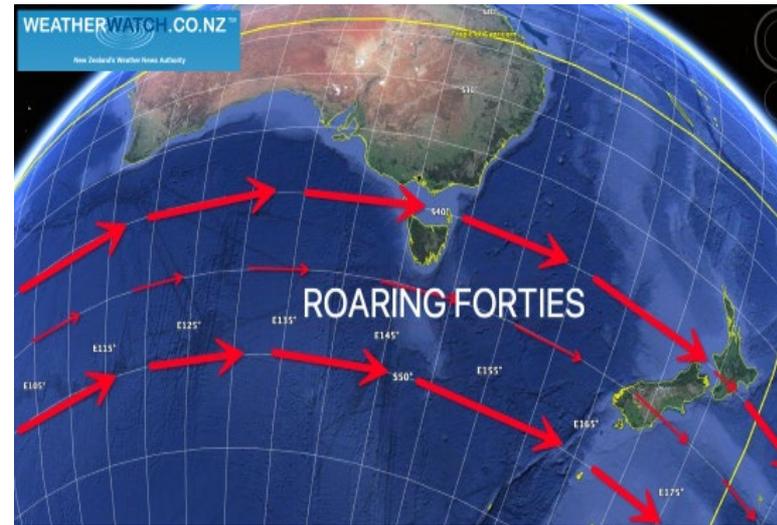
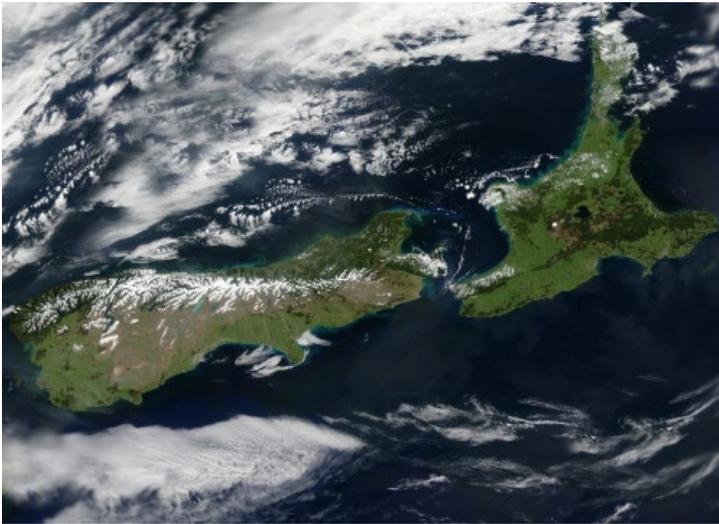


*CONTEXT*

# *11 HOURS AHEAD OF SWEDEN*



# *INFLUENCES ON WEATHER*



- On a plate margin = the earth moves
- Central mountain range = orographic weather from the west
- In the roaring 40's= dynamic weather
- Ex-tropical cyclones from the north = wet weather
- Oceans warming = marine heatwaves

# *CULTURAL CONTEXT*

- First settled from East Polynesia between 1250-1300 AD called Māori (oral culture, concepts of reciprocity)
- First European knowledge of New Zealand 1642 the Dutch Abel Tasman
- European landfall 1769 James Cook. British colonial declaration of independence 1835
- Treaty of Waitangi 1840 Māori ceded powers of government to Britain in return for the rights of British subjects and guaranteed possession of their lands and other 'treasures' (guardianship-kaitiakitanga= honorable conduct, fair process, robust consultation, good decision making)
- 1852 NZ Constitution Act gave a House of Representatives, a Legislative Council and provincial governments
- A unicameral Westminster system of government with functions and powers delegated to two levels of local government by statute

# *INSTITUTIONAL CONTEXT RELEVANT TO CLIMATE CHANGE*

- Ubiquitous natural hazards = erosion, floods, coastal erosion and flooding
- Soil Conservation and Rivers Control Act 1941
- Natural Hazards Insurance Bill (replaces the Earthquake Commission Act 1993)
- Civil Defence and Emergency Management Act (Amendment Act 2016)  
National Emergency Management Plan
- Resource Management Act controlling land use planning and water management with hazard and climate change provisions
- Climate Response (Zero Carbon) Amendment Act set up Climate Change Commission in December 2019 - advice on emissions targets & budgets, ETS settings, monitors national emissions reduction plans and national adaptation plans, undertakes national climate change risk assessments



*THE COASTAL PLANNING  
PROBLEM*

# *DECISION RELEVANT CHARACTERISTICS OF SEA LEVEL RISE*

A long lag in the oceans and polar ice-sheets to changes in global emissions, and observed SLR  
What we experience now, comes from past emissions

SLR will keep on going into next century and beyond  
This is foreseeable  
SLR becomes the dominant coastal risk driver by mid century

A near certain trajectory till mid century  
Then uncertain and dependent on global emissions trajectory  
Unresolvable uncertainties that cannot

The changes are dynamic  
The impacts are acute, chronic, compound and cascading  
Interactions between storm events, groundwater and past adaptations

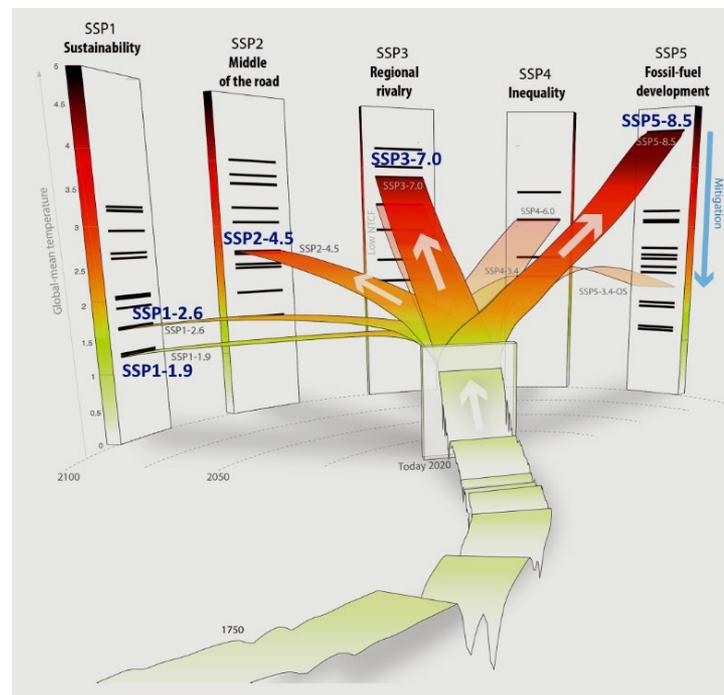
Impacts are influenced by what is exposed, how sensitive it is and our adaptive capacity

Protect and accommodate adaptations have physical, affordability, effectiveness and tolerance limits

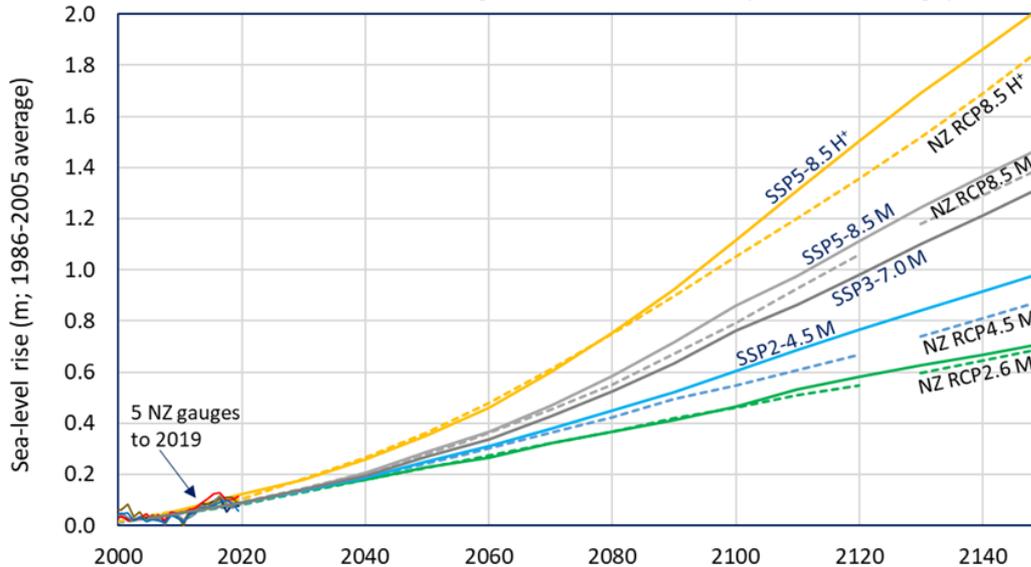
Avoidance and retreat adaptations only effective adaptations  
Planning for them now can leverage a shift from reactive to anticipatory decisions

# SEA LEVEL RISE SCENARIOS AND VERTICAL LAND MOVEMENT

A SLR Platform for scenarios and SLR curves <https://searise.takiwa.co/> 2022

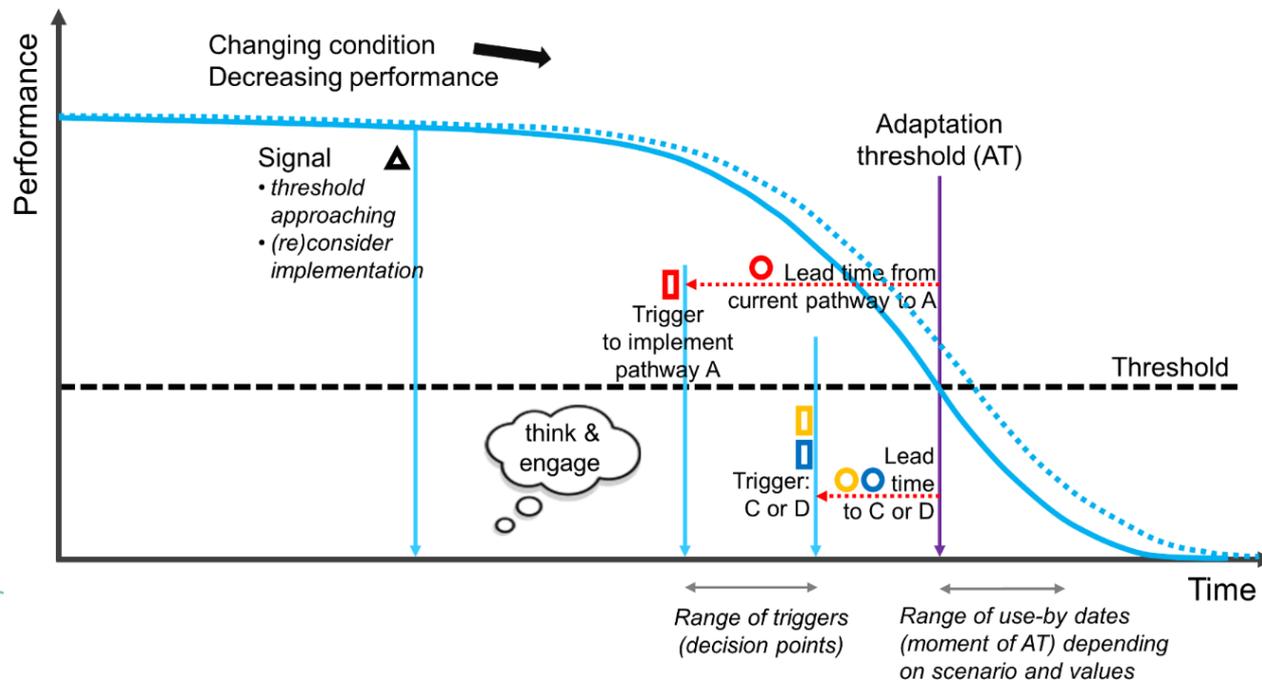


SLR scenarios: 2017 MfE guidance vs NZSeaRise (national-average)



# PERFORMANCE OF ADAPTATION MEASURES DECREASE OVER TIME

Performance of options/ designs/ infrastructure will decrease over time and will reach limits



## Adaptation limits

- Physical and socioeconomic
- Soft limits
- Hard limits

# *LIMITS TO ADAPTATION*

Defined by the IPCC (AR6 2022) as:

The point at which an actor's objectives (or system needs) cannot be secured from intolerable risks through adaptive actions.

- Hard adaptation limit - No adaptive actions are possible to avoid intolerable risks.
- Soft adaptation limit - Options are currently not available to avoid intolerable risks through adaptive action.

# *BUT WE ARE ADDICTED TO “PROTECTION”*

- Current land uses have existing use rights based on current static planning instruments and difficult to change
- Intensification to existing land uses which increases the risk
- New land uses we have choices where to go
- Protection has space, time and affordability limits
  - Not all exposed land uses can be “protected”
  - Accommodation (raising buildings, filling land) is temporary



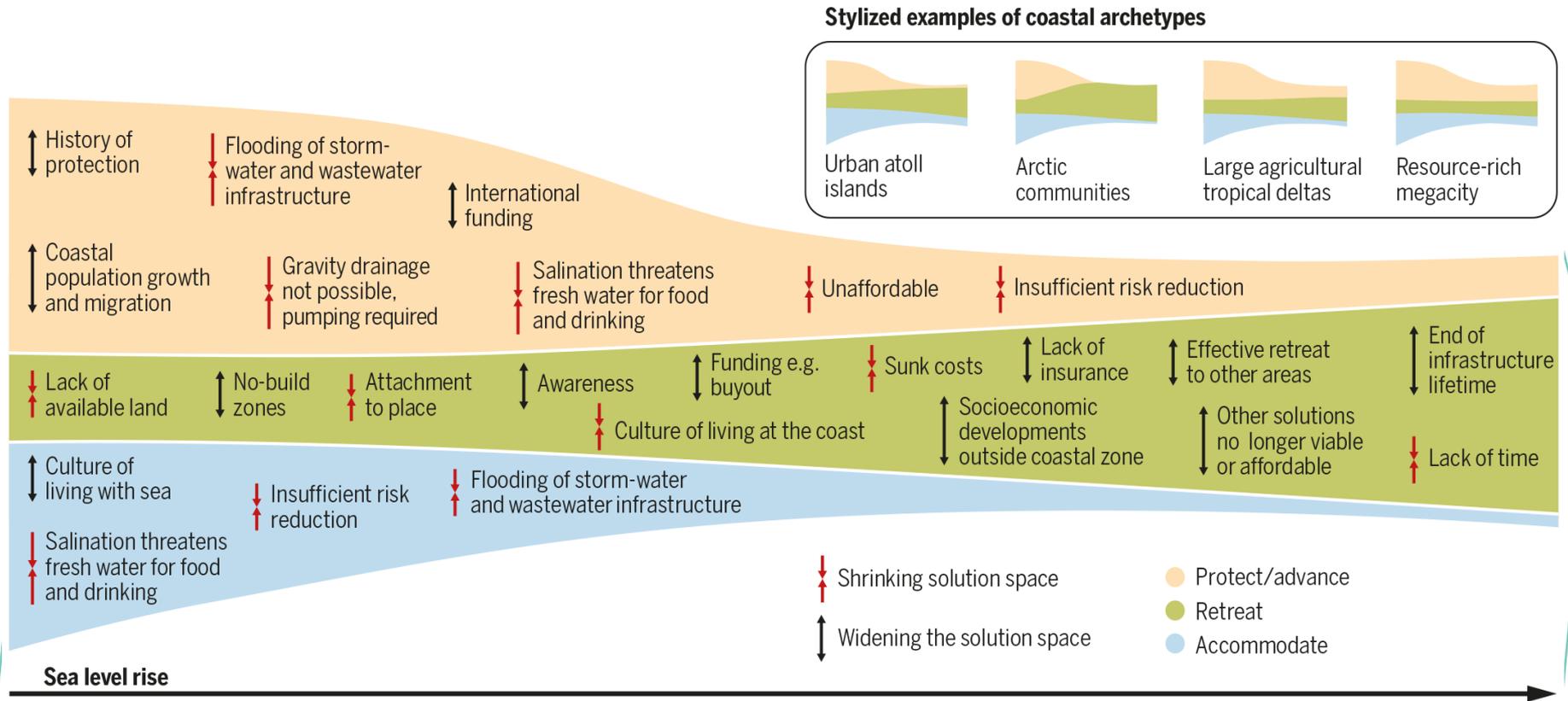
# *THE RISKS OF MALADAPTIVE DECISIONS*

Those that lock us into unsustainable pathways

- More development in low-lying coastal areas creating legacy effects and transfer risk to future generations
- Delay in reducing emissions increases the adaptation burden
- Delay in developing and implementing adaptive plans means we will not be prepared for the foreseeable sea-level rise

# The evolving and shrinking solution space to address sea level rise

The colored areas show how the solution space to protect/advance, accommodate, and retreat changes as sea level rises. Different drivers and soft or hard limits shape this space. The figure highlights, first, a general narrowing of the solution space as a whole and, second, a change in the ratio between the three adaptation strategies, with retreat becoming dominant. This applies differently across coastal archetypes (derived from (1), see inset) due to local contexts.



Source: Haasnoot, Lawrence, Magnan 2021 *Science* (April 2021)

# MANAGED RETREAT AS A RESPONSE TO COASTAL HAZARDS UNDER A CHANGING CLIMATE

Local governments are required to

- consider the effects of CC
- give effect to the New Zealand Coastal Policy Statement in plans (a national direction) based on *precautionary principle*

Legislative replacement  
imminent

Strategic Planning Bill 2022

Natural and Built Environment  
Bill 2022

Climate Adaptation Bill 2023

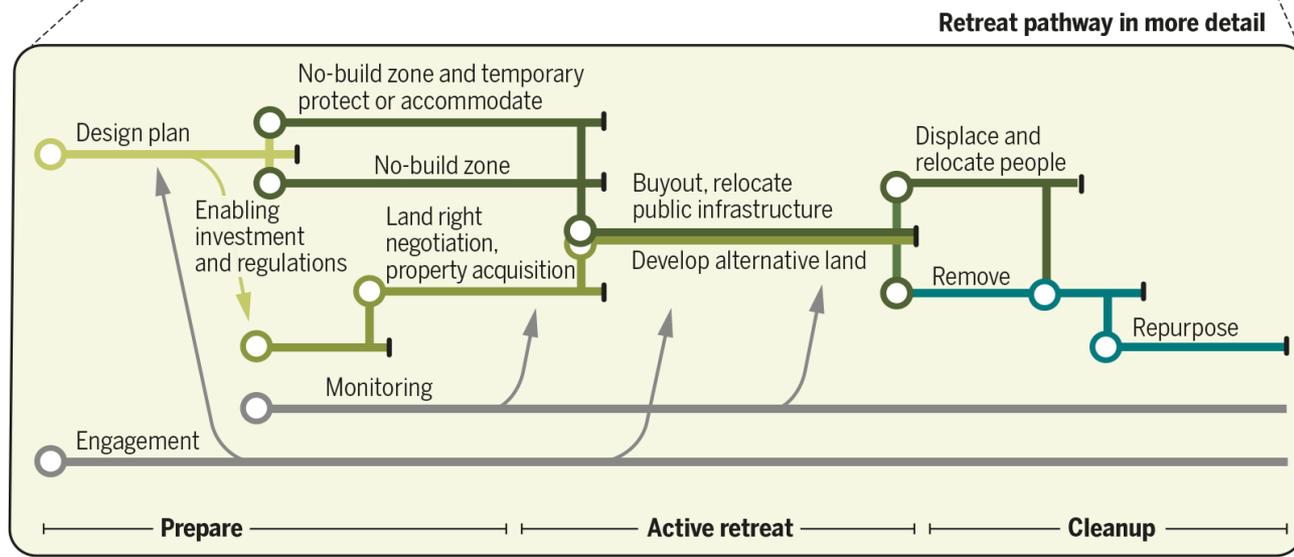
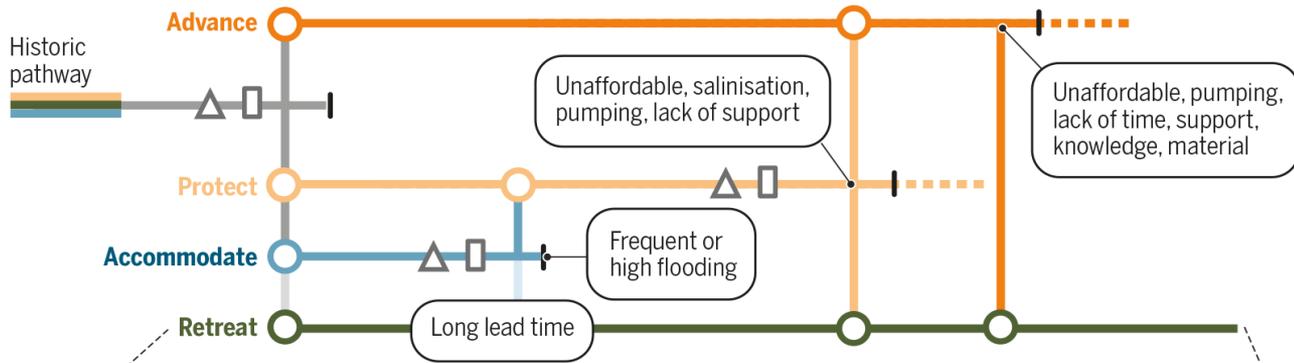
- how to address existing use rights
- funding of adaptation
- planned and managed retreat

# *DECONSTRUCTION OF MANAGED RETREAT*



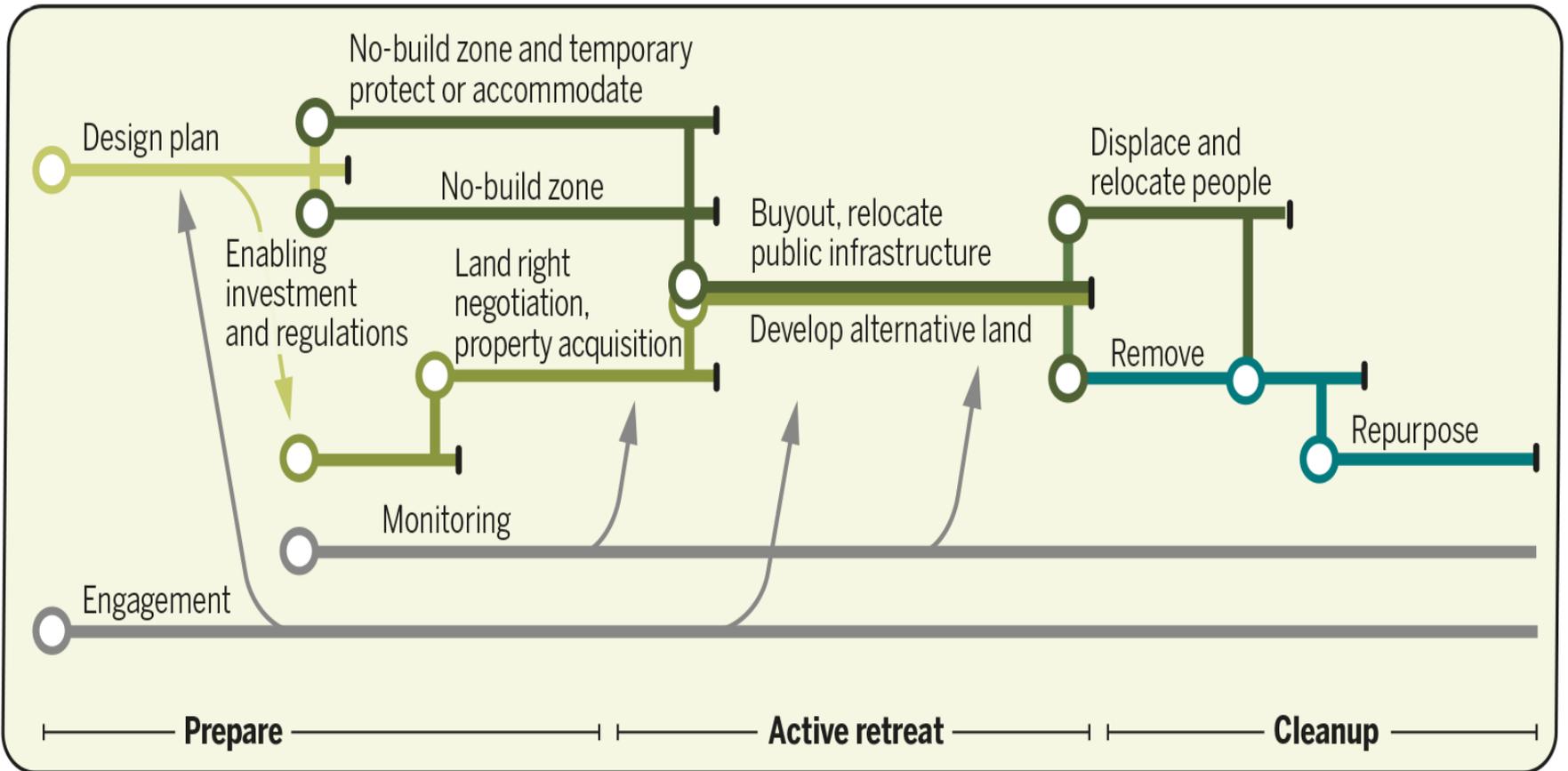
# Indicative adaptation pathways of retreat

Retreat is presented as a nested pathway within a broader pathways map, including advance, protect, and accommodate. Retreat comprises three stages: prepare, active retreat, and clean-up. Engagement and monitoring support planning and implementation (grey lines). After designing a plan, land use regulations and temporary measures can be implemented, followed by buyout. Enabling investments and regulations are precursor actions.



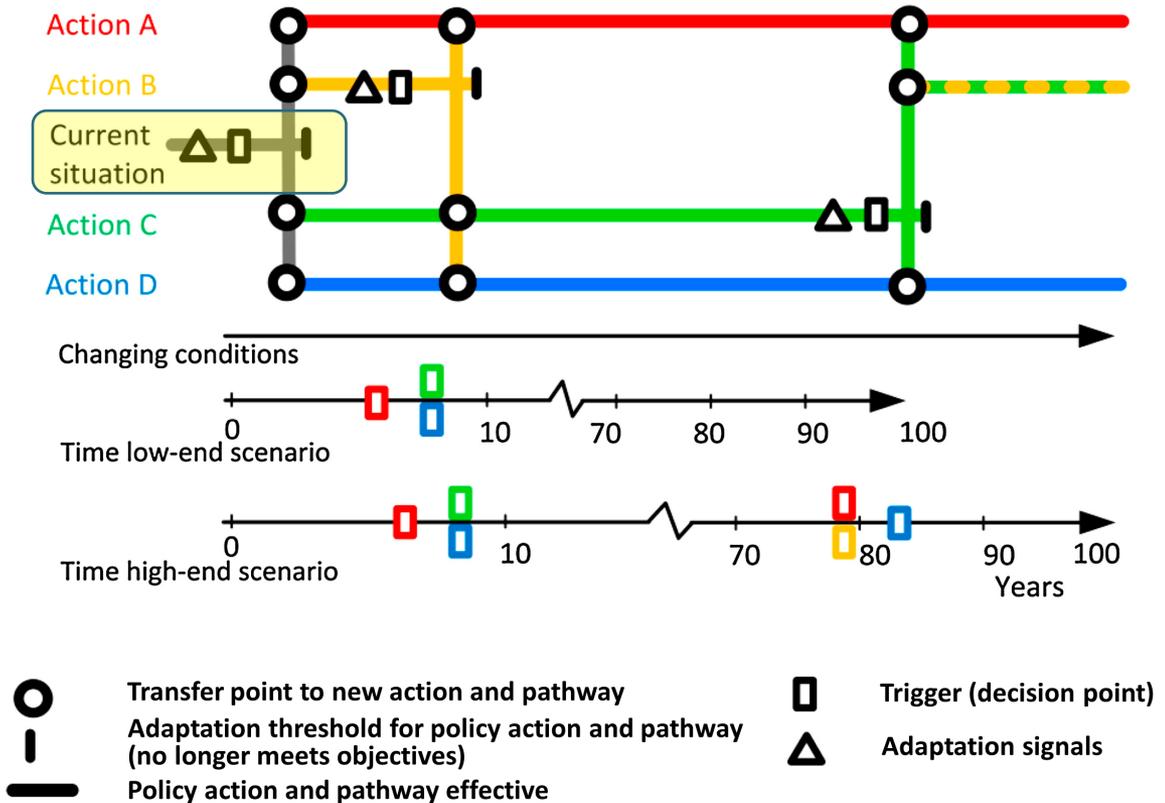
- Transfer to new portfolio/action
- Portfolio/action effective
- ▲ Adaptation signal
- | Adaptation threshold
- - - Uncertainty in effectiveness
- Decision node

## Retreat pathway in more detail



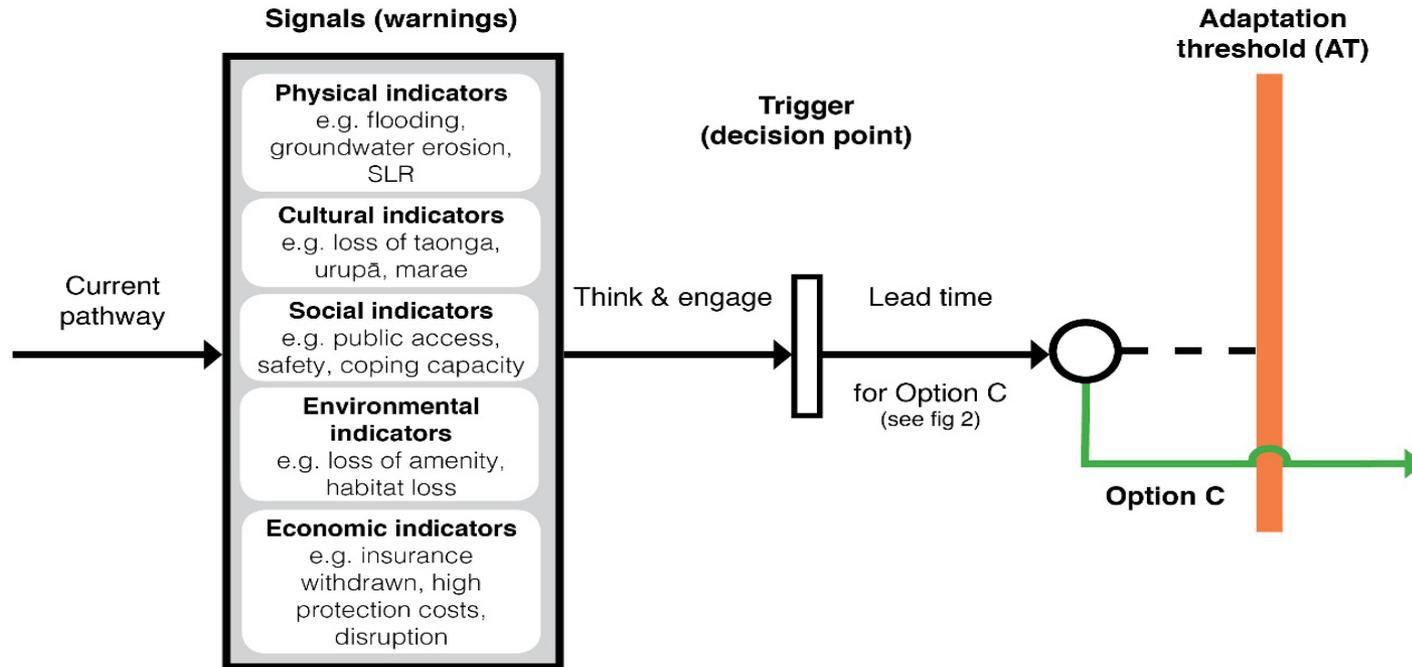
# DYNAMIC ADAPTIVE PATHWAYS PLANNING (DAPP)

- **Dynamic** – ability to respond to changing conditions and perceptions
- Not dependent on time – focuses on **thresholds**
- Mix of short-term **actions** and long-term **options** – to avoid locking in inflexibility
- **Stress test options** versus 4 SLR scenarios
- **Anticipatory** (avoid adaptation threshold) rather than reactive
- **Timely adaptation** by monitoring early signals and triggers (decision point)



After Haasnoot et al. (2013), Hermans et al. (2017)

# MONITORING PATHWAYS



Source: Bell, Stephens, Lawrence et al 2018

# A GUIDE FOR MONITORING SIGNALS AND TRIGGERS

## Phase 1: Foundations

- Task 1: Engagement Plan
- Task 2: Refine Objectives
- Task 3: Articulate DAPP

## Phase 2: Adaptation Thresholds Signals & Triggers

- Task 4: Define Thresholds
- Task 5: Describe Signals and Triggers
- Task 6: Produce Alert Criteria
- Task 7: Test Sensitivity to Scenarios

## Phase 3: Monitoring Regime

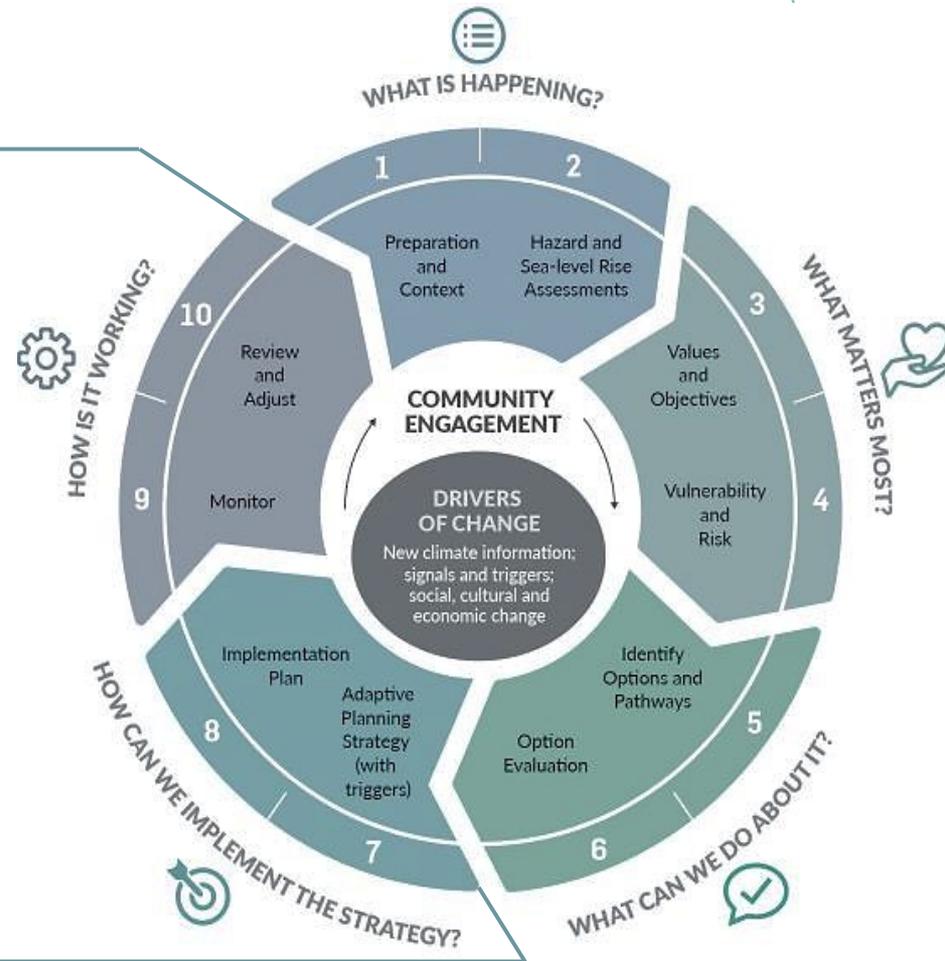
- Task 8: Responsibilities
- Task 9: Management and Reporting

## Phase 4: Formalise the Regime

- Task 10: Options to Formalise Signals and Triggers

## Phase 5: Post-Alert Implementation & Review

- Task 11: Activate review
- Task 12: Activate successive actions
- Task 13: Activate any change processes

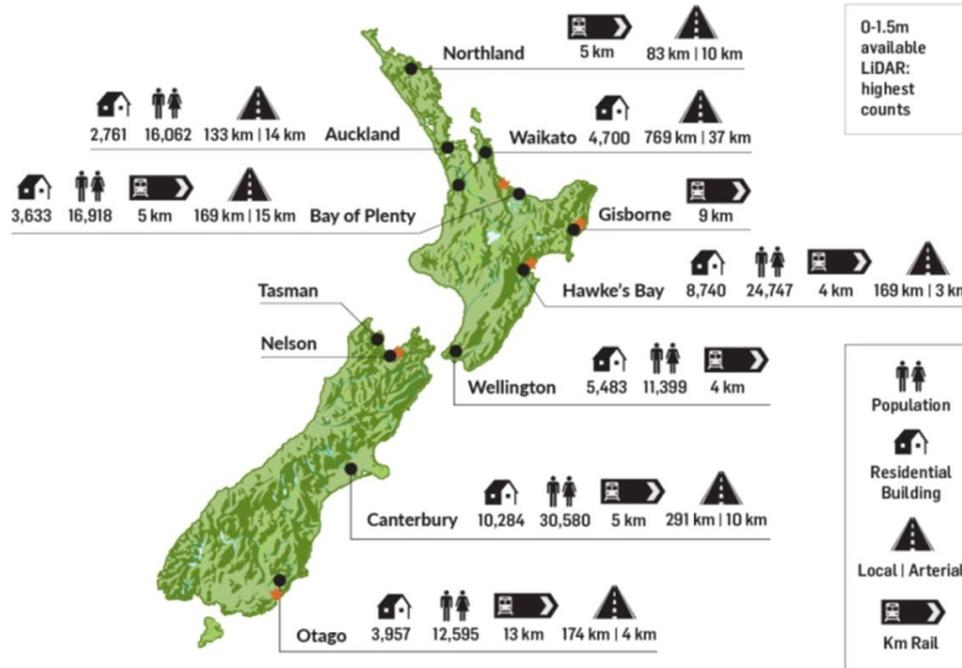


# *FLEXIBILITY IN STATUTES*

- Provide for dynamic processes in statutory objectives
- Provide for identification of “no-go” areas based on risk and expression of community tolerance using signals and triggers for adaptive action
- Mandate an adaptive process and tools e.g. Dynamic Adaptive Pathways Planning in regulations
- Mandate monitoring of changing risk, based on tolerable risk levels set out in the National Risk Assessment
- Monitoring meaningful indicators at a local level

# IDENTIFY NATIONAL EXPOSURE

## Impact of +1.5m sea-level rise around New Zealand

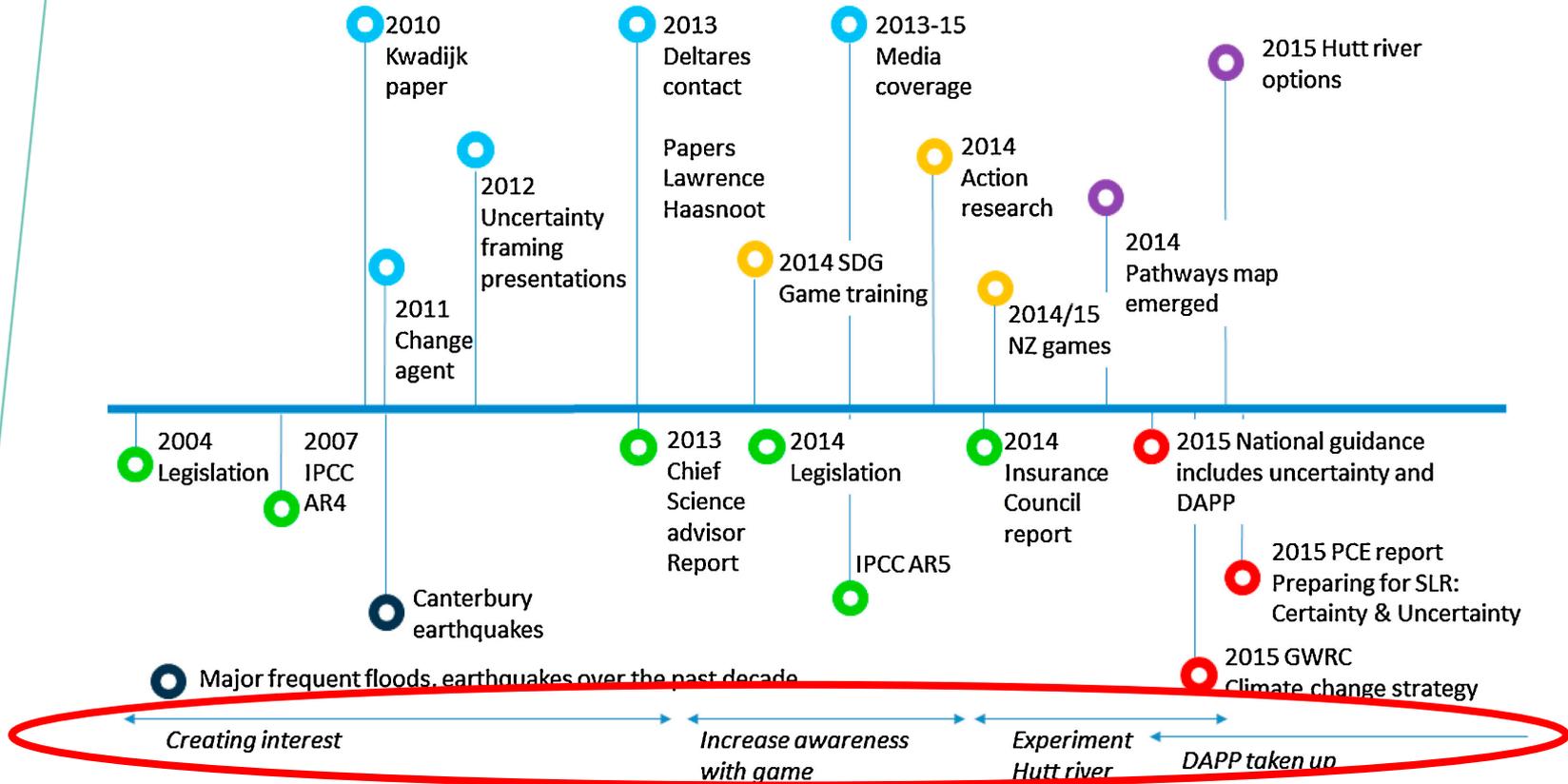


MfE (2017) *Coastal hazards and climate change: guidance for local government*. Wellington: Ministry for the Environment, p. 19

New Zealand	1.8 mm/year from 1900–2018, 1.2 mm/year from 1900–1960 and 2.4 mm/year from 1961–2018 (Bell and Hannah, 2019)	NZD\$25.5 billion (Paulik et al., 2020)	75,890 (Paulik et al., 2020)	105,580 (Paulik et al., 2020)	4000 km pipelines, 1440 km roads, 101 km rail, 72 km electricity transmission lines (Paulik et al., 2020) NZD\$5 billion (2018) (reserves, buildings, utility networks, roads) (LGNZ, 2019)
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*HOW DID WE GET HERE?*

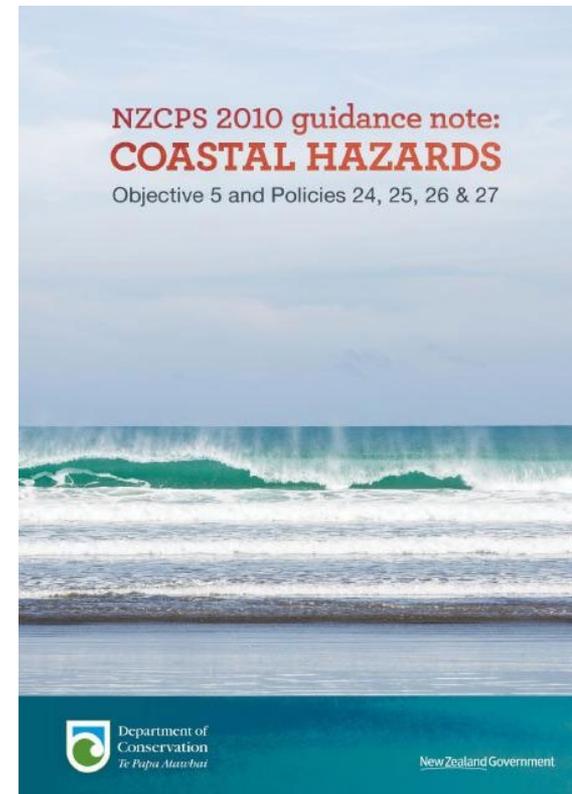
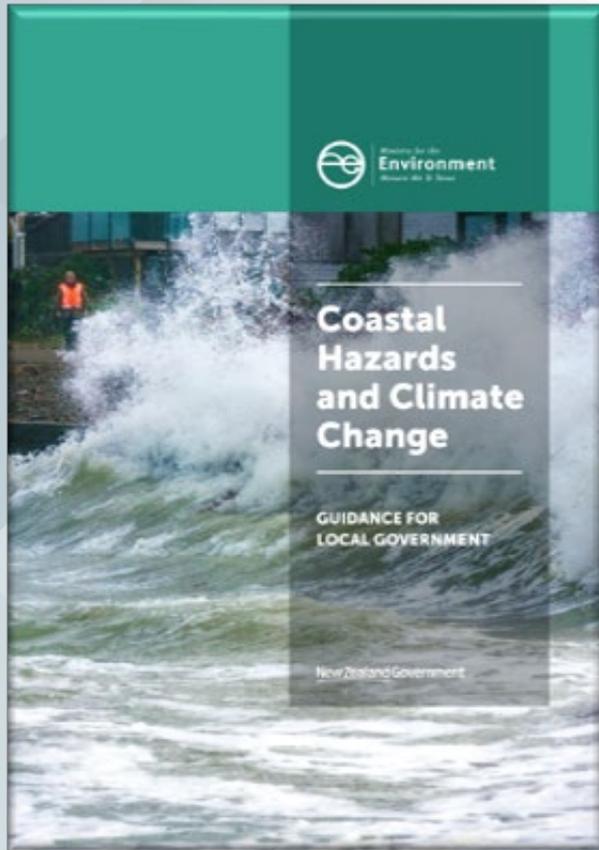
# GAMES TO MAINSTREAM



Blue = Creating interest, Yellow = Increasing awareness  
 Purple = Experiment Hutt river, Red = DAPP uptake, Dark Blue = Major hazard events, Green = context.

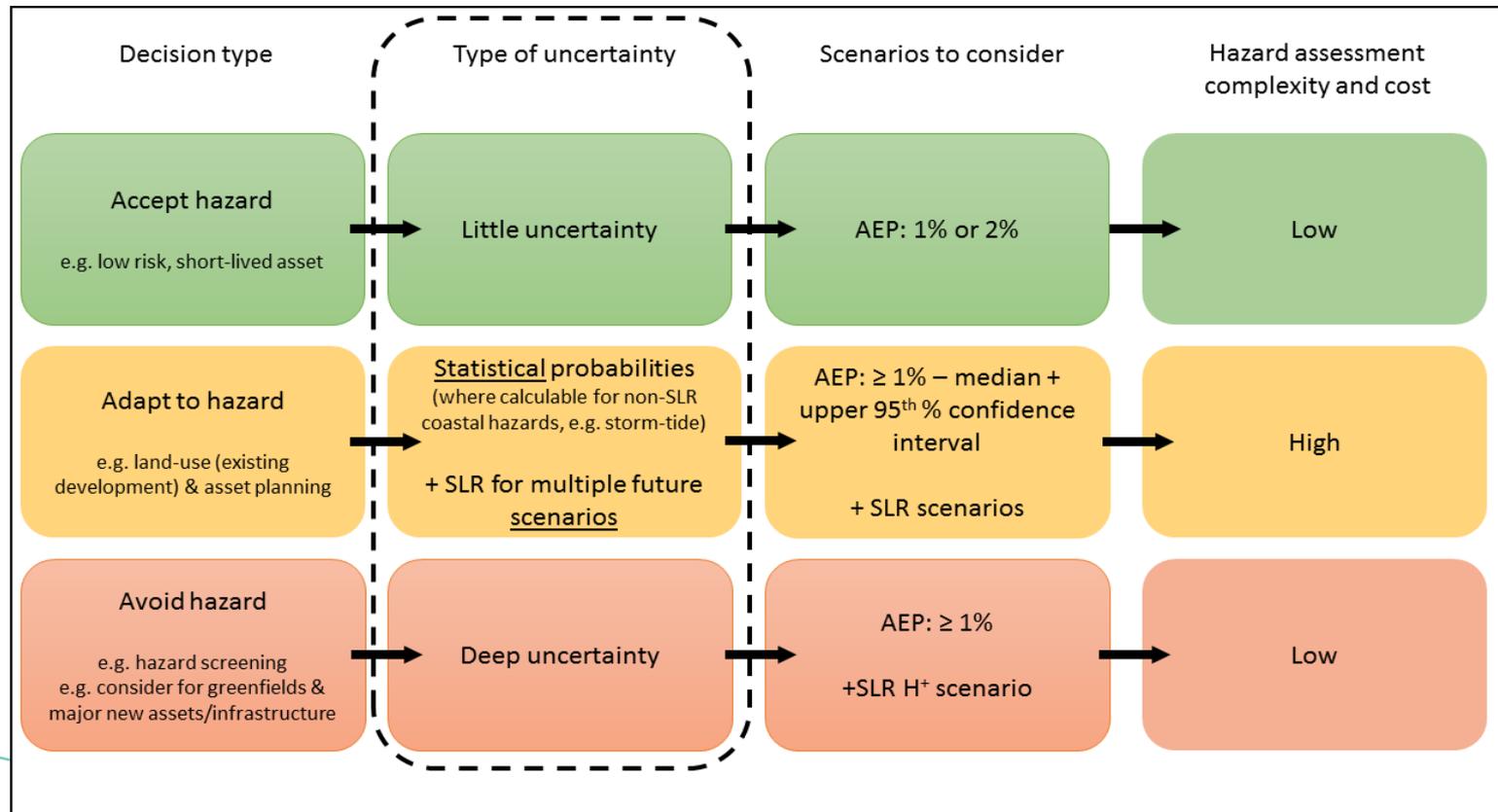
# NATIONAL COASTAL HAZARDS AND CLIMATE CHANGE GUIDANCE FOR LOCAL GOVERNMENT

New Zealand Coastal Policy Statement 2010



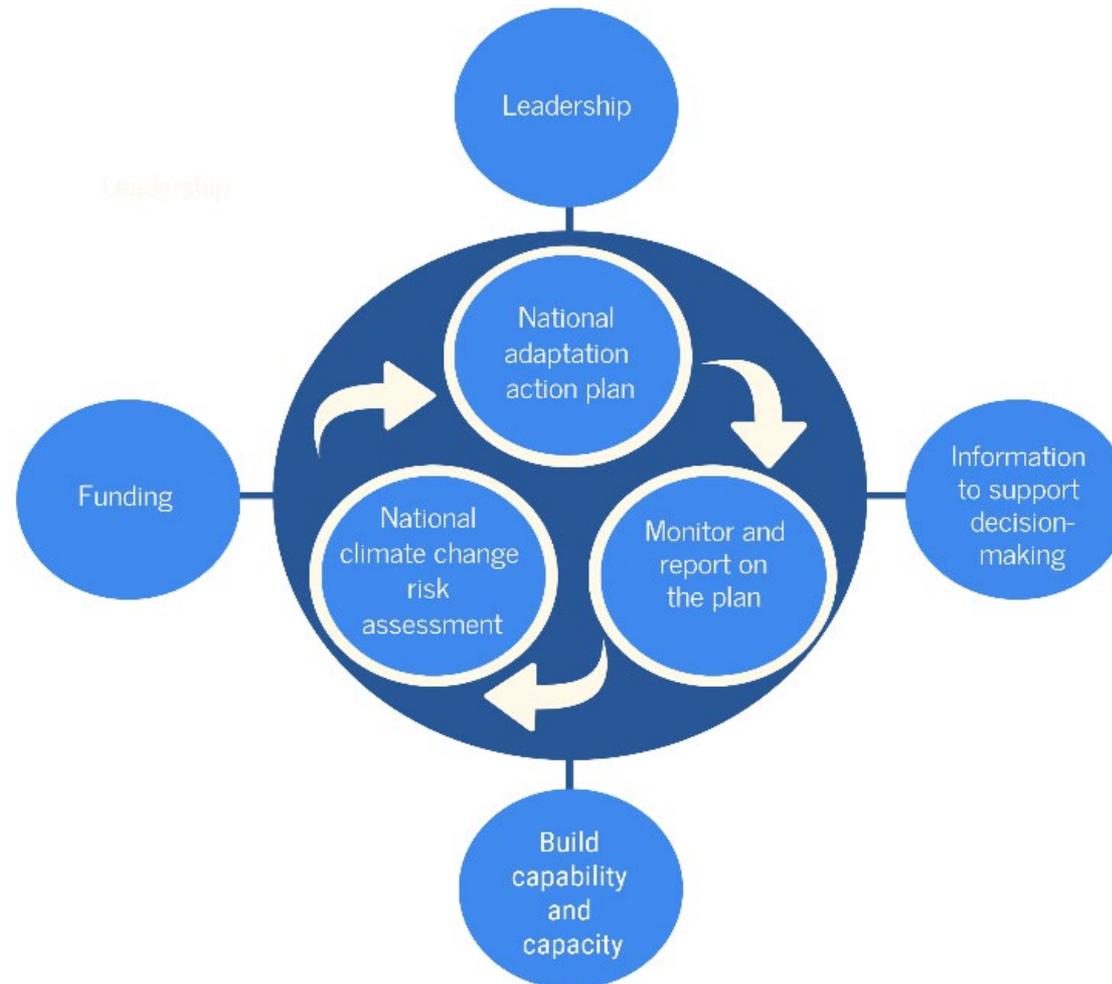
# UNDERSTANDING DIFFERENT LEVELS AND TYPES OF UNCERTAINTY

Translated into decision rules

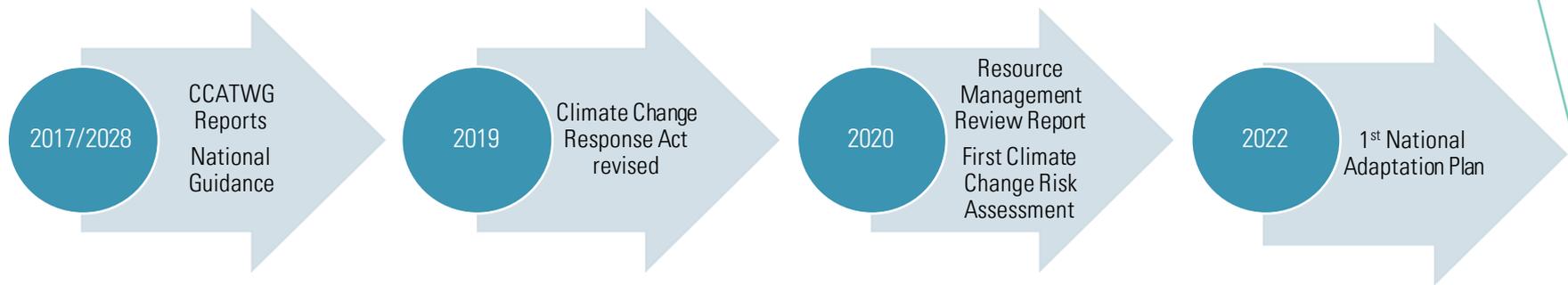


# *THE NATIONAL ADAPTATION INSTITUTIONAL FRAMEWORK*

Climate Change Adaptation Technical Working Group recommendations (2018)



# *INTEGRATION WITH POLICY*



Ongoing engagement with local government, the public, stakeholders and iwi Māori

Strategic Planning Act and Natural and Built Environment Act late 2022  
Adaptation Act early 2023

# *CLEAR MANDATES ARE KEY*

National-level mandates create certainty for those operating under the law.

- Localized impacts of CC
- Multiple, different stressors across country
- Uneven distribution
- New and emergent risks

Essential elements:

- National-level support for developing local adaptation plans, e.g., risk and vulnerability mapping, finance
- Responsibilities and power clearly defined
- Statutory requirements on NAP process
- Statutory instruments for embedding flexibility

# *THE ENABLERS*

- A history of regular experienced hazards
- Governance well connected to community
- Environment that encourages institutional innovation and fast adapters and adopters
- Strong research support and links internationally
- Cross party support for CCRA vital
- High level of community engagement
- Legislative processes that can respond quickly
- Active youth engagement with CCRAct (they drafted the first draft)
- The pressure is kept on decision makers
- Reputational risks are high for a small isolated country

# *THE BARRIERS*

- Entrenched interests dominate the narrative
- Focus on emissions reduction has crowded out attention to adaptation
- 3 year electoral cycle (partially reduced by cross party agreement on CCRAct through role of Greens as a Government party and Minister of Climate Change)
- Lack of a coordinated climate change research platform (Science Challenges have built some scale)
- Lack of coordination across sectors and domains of interest
- Lack of statutory alignment
- Lack of understanding of the problem across the community
- Lack of access to usable data and information
- Misinformation and climate denial (balanced by higher visibility of CC globally)

# *CONCLUSION*

- A long lead time to get acceptance of the need for a new paradigm
  - Keep all options open
  - Avoid lock in of decisions that create legacy effects
  - Use dynamic adaptive tools and games to prime precautionary thinking
  - Political leadership has been vital
- Adaptive capacity has to be built
- Engagement with communities of interest
- Governance and leadership is key for statutory change that embeds flexibility
- However time will tell if this effects the needed changes

# *Questions*



R Bell