

# *Pathways to Change*

## Workshops 24<sup>th</sup> & 26<sup>th</sup> July 2012



A central graphic features a map of New Zealand with three green islands labeled "Step 1 Awareness & Acceptance", "Step 3 Planning a way forward", and "Part or Done". A red speech bubble on the left says "Help!" with a cross and a hand icon. A white box in the bottom left contains the NIWA logo and text. Another white box in the bottom right contains the ag research logo and text. The bottom center contains the FRST/MBIE contract number.

**NIWA**  
Taihoro Nukurangi

**ag research**  
Implementation Monitoring & Review

FRST/MBIE contract number C01X0802

# *Pathways to Change*

## *Workshops 24<sup>th</sup> & 26<sup>th</sup> July 2012*



**Presented by:**

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FRST/MBIE contract number C01X0802

# Welcome to our *Pathways to Change* workshop



# Welcome to our *Pathways to Change* workshop



- Introductions
- Housekeeping
- Emergency information
- Telephones



# Introductory Session

## Overview

- Adaptation planning is very challenging and there are no simple answers
- Most coastal communities will have to face this challenge
- Future resilience of these communities will depend on how successfully they do this
- Ad hoc reactions have seldom been successful to date, and are even more unlikely to be successful with coastal climate change – a comprehensive and strategic approach is required
- The *Pathways to Change* document provides a framework for effective adaptation planning

# Introductory Session

## Aim of the Day

To encourage and better equip you to undertake adaptation planning through:

- Providing an overview of the *Pathways to Change* document
- Sharing experiences, case studies and best practice
- Getting you thinking about the issues you face and how you may address them
- Taking home with you some encouragement and some ideas for next steps back in the office

# Introductory Session

## Structure for the day

1. Introduction - relevant climate change science, your challenges, and the need for effective adaptation planning
2. Overview and discussion of Step 1 Awareness and Acceptance
3. Overview and discussion of Step 2 Assessment  
*Lunch*
4. Overview and discussion of Step 3 Planning a Way Forward
5. Overview and discussion of Step 4 Implementation, Monitoring and Review
6. Wrap-up and takeaway messages – close by 4 pm

# Context

## Climate Change is real

- Significant global warming is occurring - numerous lines of evidence, including:
  - Direct measurements of rising surface air temperatures and subsurface ocean temperatures
  - Increases in average global sea levels
  - Widespread retreat of mountain glaciers
  - Changes to many physical and biological systems
- Most of the observed increase in global average temperatures since the mid-20th century is very likely due to greenhouse gas emissions from human activities –
  - Atmospheric concentrations of greenhouse gases significantly elevated (e.g. CO<sub>2</sub> from 280 ppm to 388 ppm (2009) – higher than any time last 420,000 years)

# Context

## Climate Change is real

- Strong scientific basis and consensus
  - Numerous joint and independent statements by national scientific academies of all leading countries (US, China, India, Russia, UK, France, Germany, Japan, Canada, Brazil, etc)
  - Surveys show 96-97% climate scientists accept

# Context

## Climate Change is not business as usual

- Climate change will pose major challenges for coastal communities
- The scale of these challenges will depend on future warming – but significant changes are now very likely
- The changes will impact on the nature and severity of coastal erosion, the frequency and severity of coastal flooding, coastal ecosystems, drainage, etc

# Context

## The challenge of adaptation

- Adaptation is inevitable – probably for centuries. Mitigation is essential but can no longer prevent change
- Political and community apathy and skepticism are significant barriers to effective action
- There is a major disconnect between the seriousness of the issue and political/community response to date
- The challenge is to get momentum rolling on adaptation planning despite the barriers
- The responsibility lies with people like you!
- Hence “*Pathways to Change*” – from here ‘PTC’
- This is a two-way (not a one-way) workshop!

# Introductory session

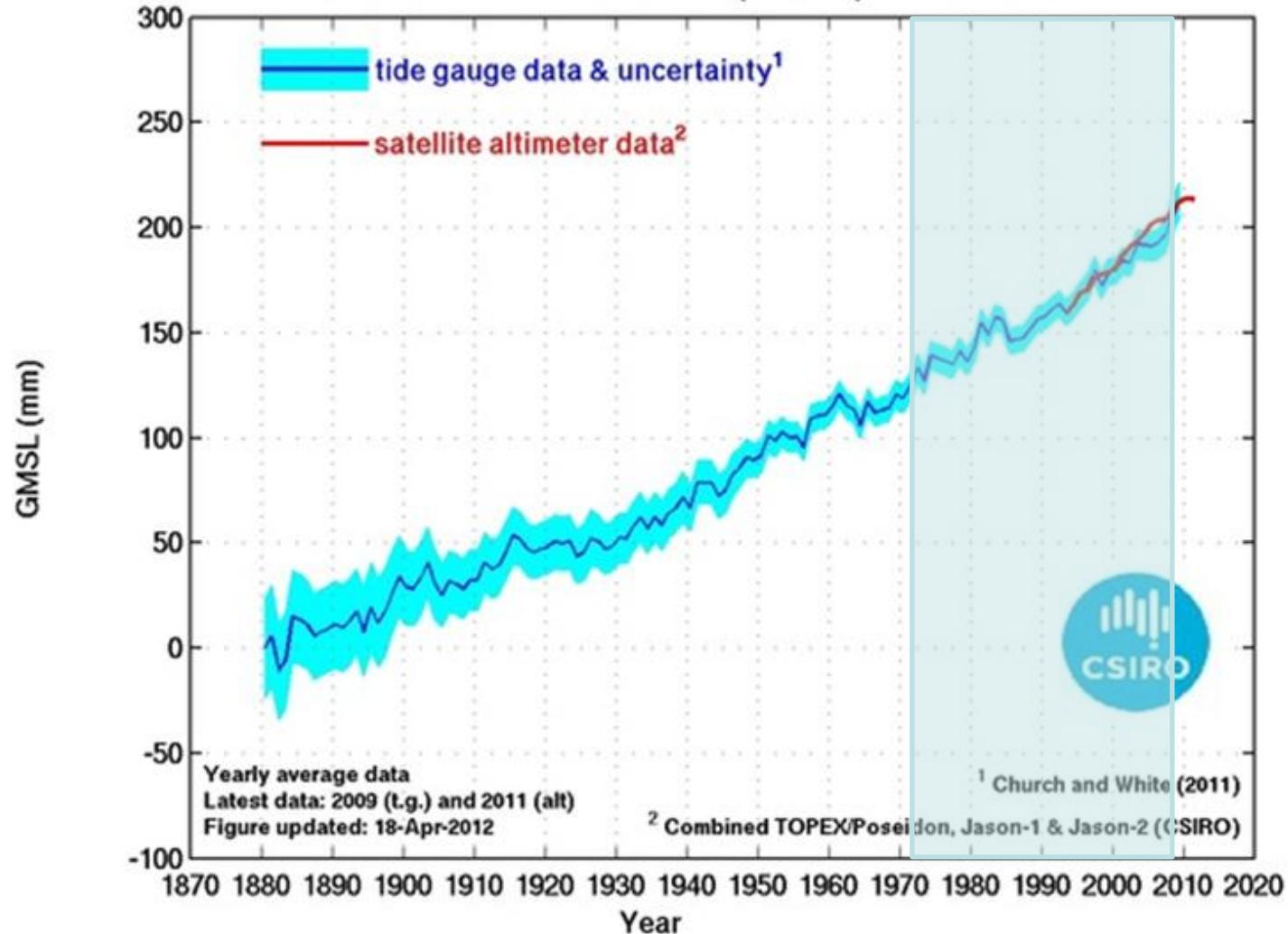
# Coastal climate change



R Bell

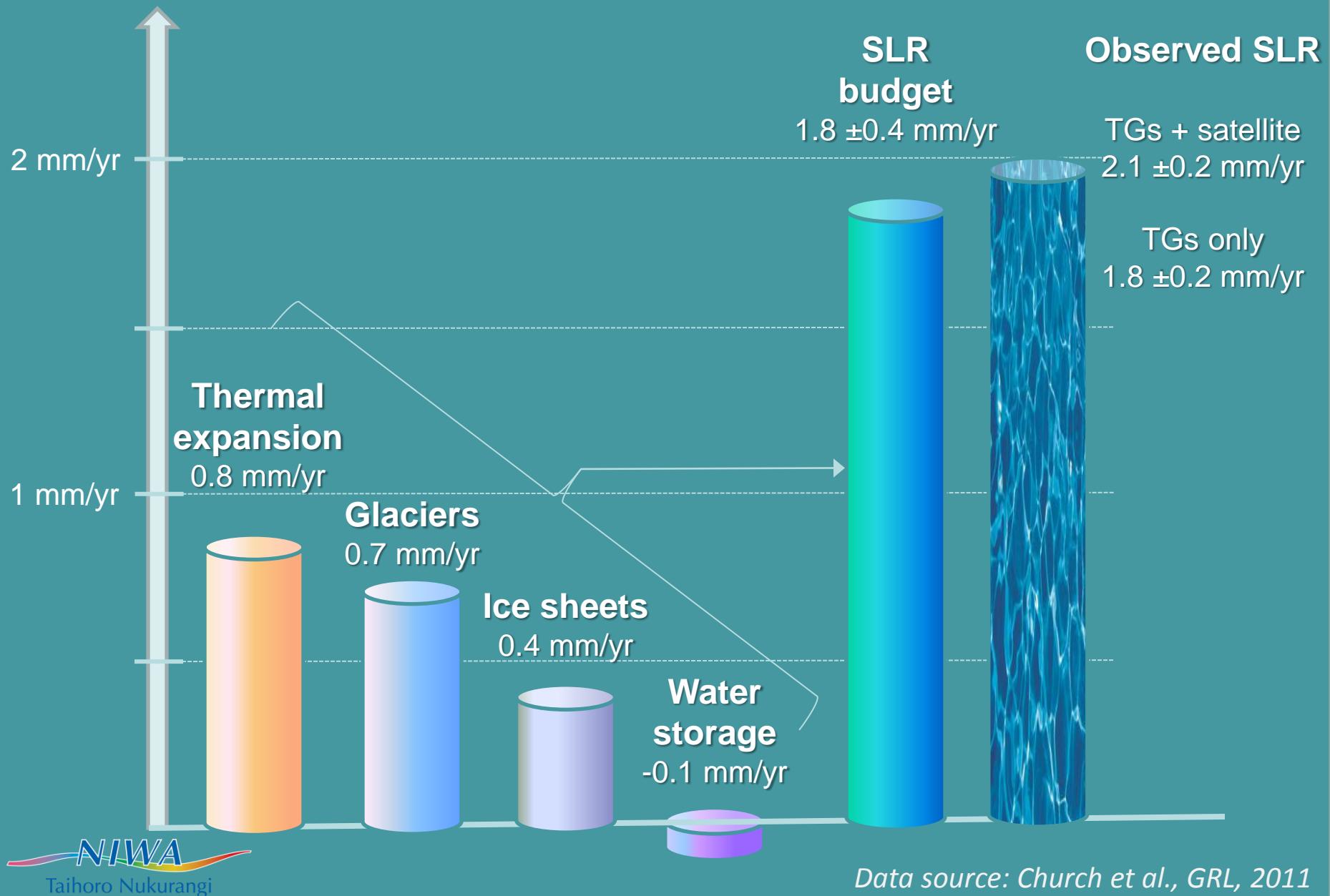
- Status of latest research
- Implications for coastal communities
- Other potential impacts

## Global Mean Sea Level (GMSL) - 1880 to 2011



Global average rate: ~0.2 m in 120 years

# Sea-level budget: 1972 to 2008



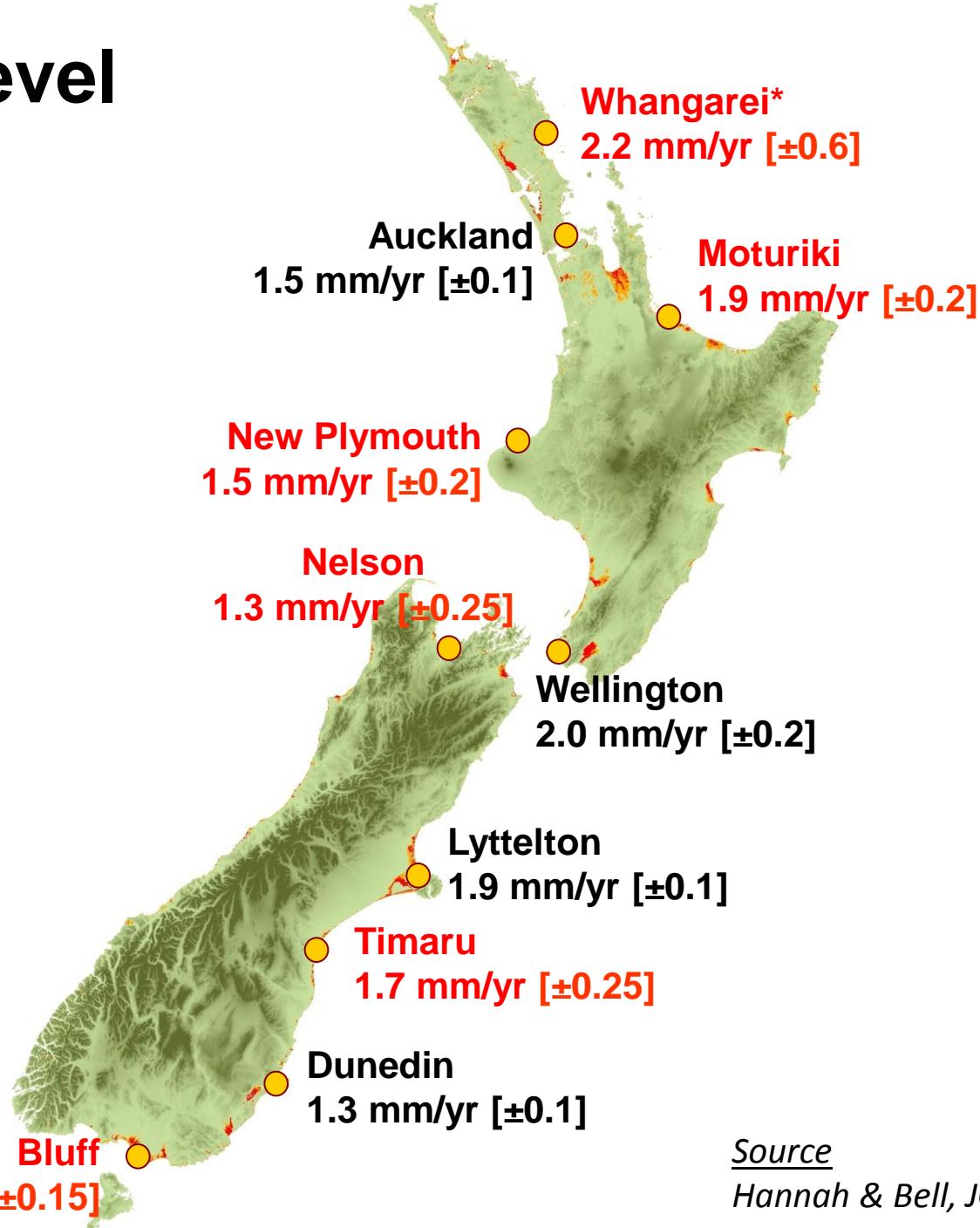
# Relative sea-level rise for NZ (to 2008)

NZ average relative  
SLR (4 main ports):  
 $1.7 \pm 0.1 \text{ mm/yr}$

NZ average relative  
SLR (all 10 sites):  
 $1.7 \pm 0.1 \text{ mm/yr}$

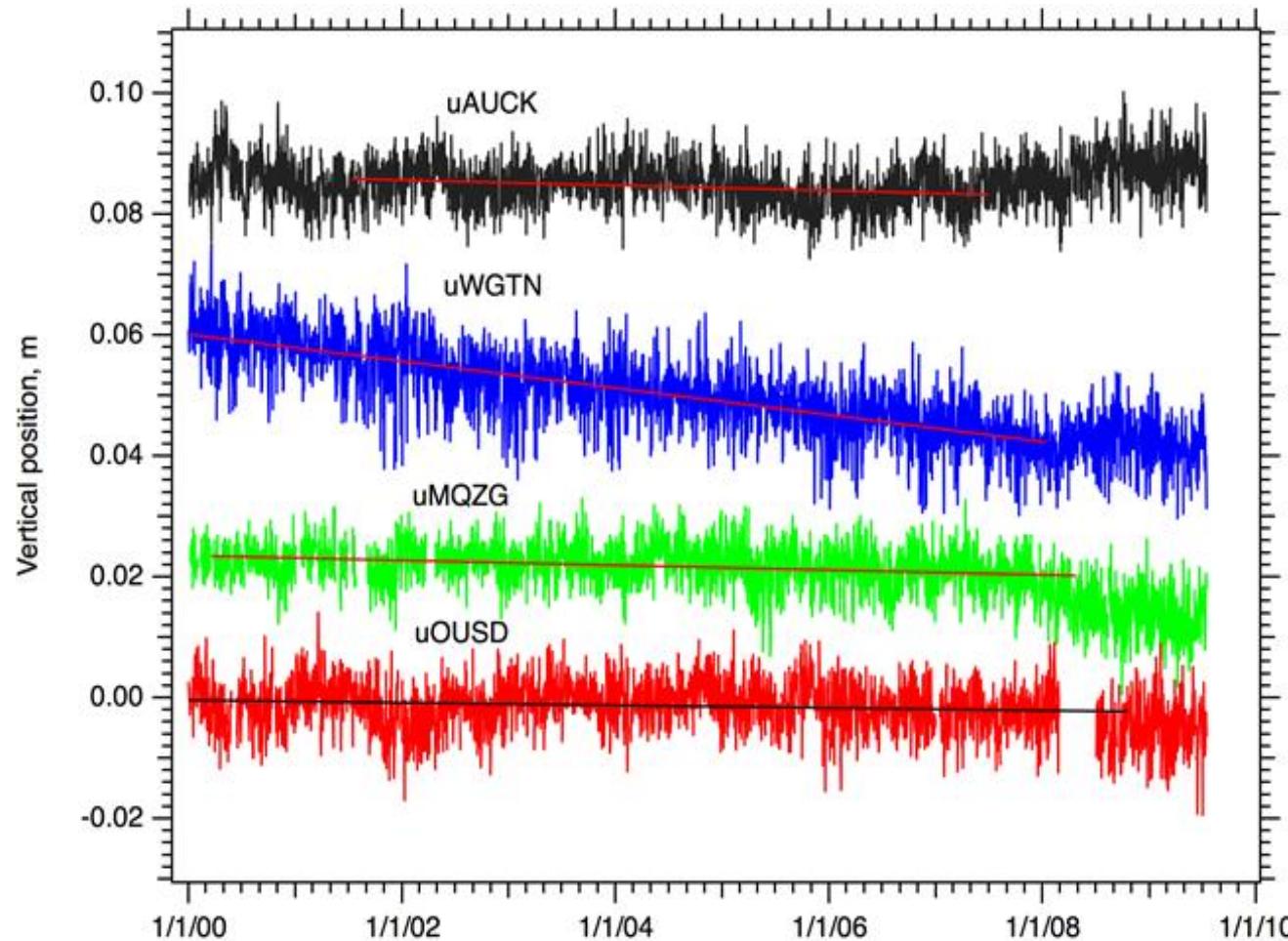
Based on historic  
MSL datum

**Bluff**  
 $1.8 \text{ mm/yr } [\pm 0.15]$



*Source*  
Hannah & Bell, JGR, 2012

# Vertical landmass movement: SSEs



Land subsidence (slow-slip events) in Wellington:  $\sim -1.7 \text{ mm/yr}$  since at least 2000  
⇒ relative sea-level rise is temporarily(?) 2x the NZ-average rate

# New Scientist: 22 Oct 2011:

**Know:** Sea level is going  
to rise many metres

**Don't know:** • • • • • • • • •

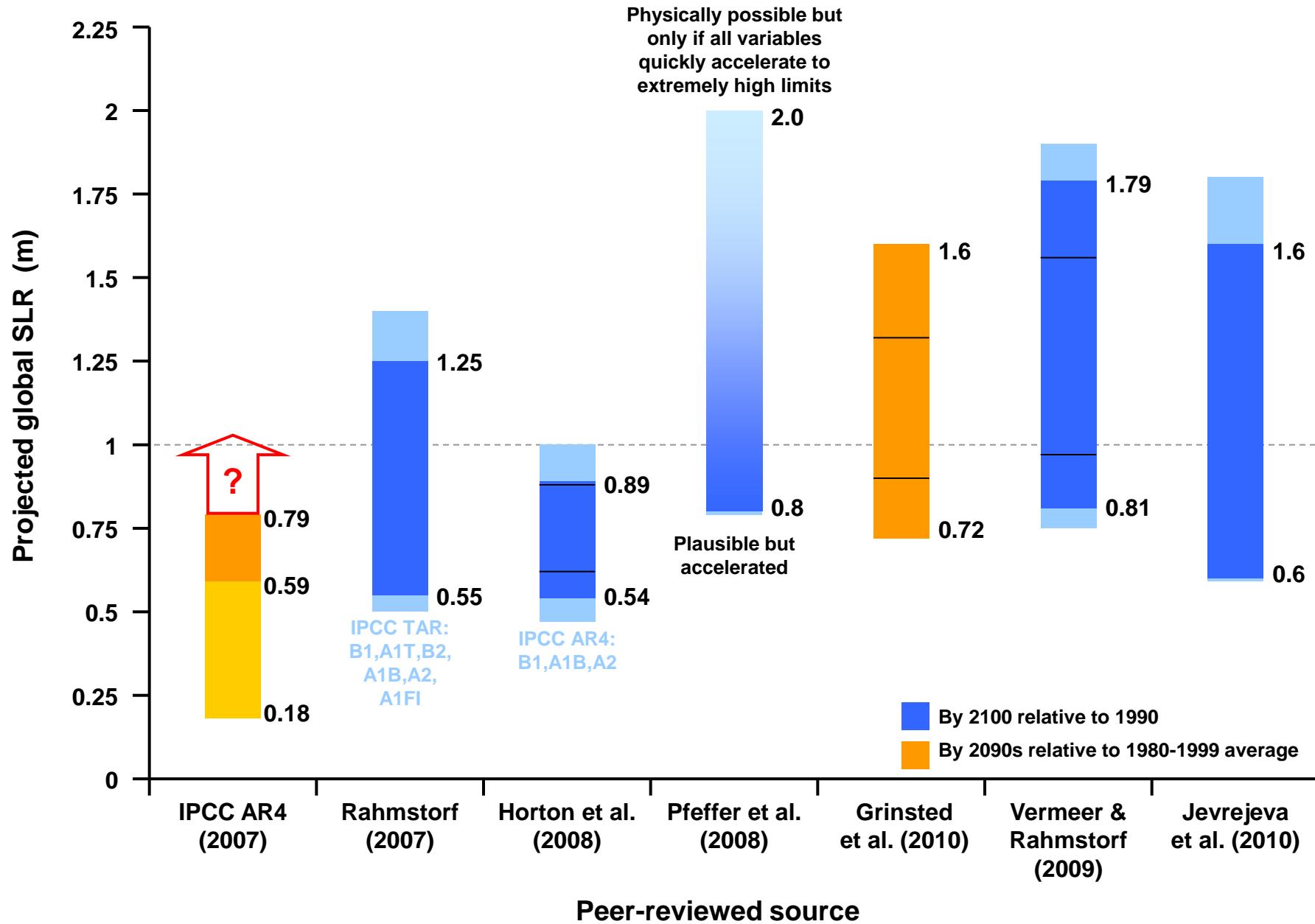
How quickly sea level will rise

Special Report: Climate Change

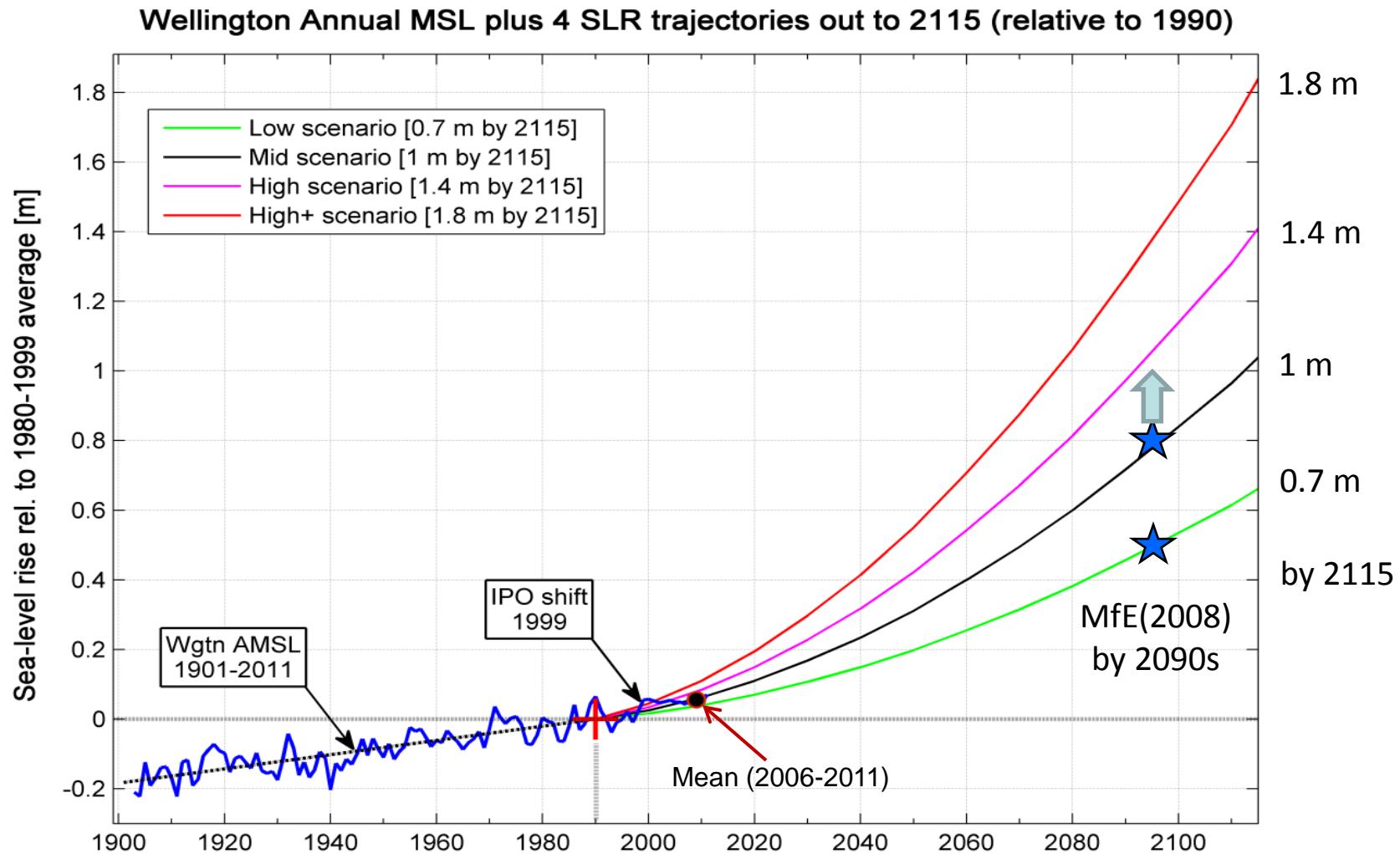
***What we do know – and what we don't***

Michael Le Page (2011)

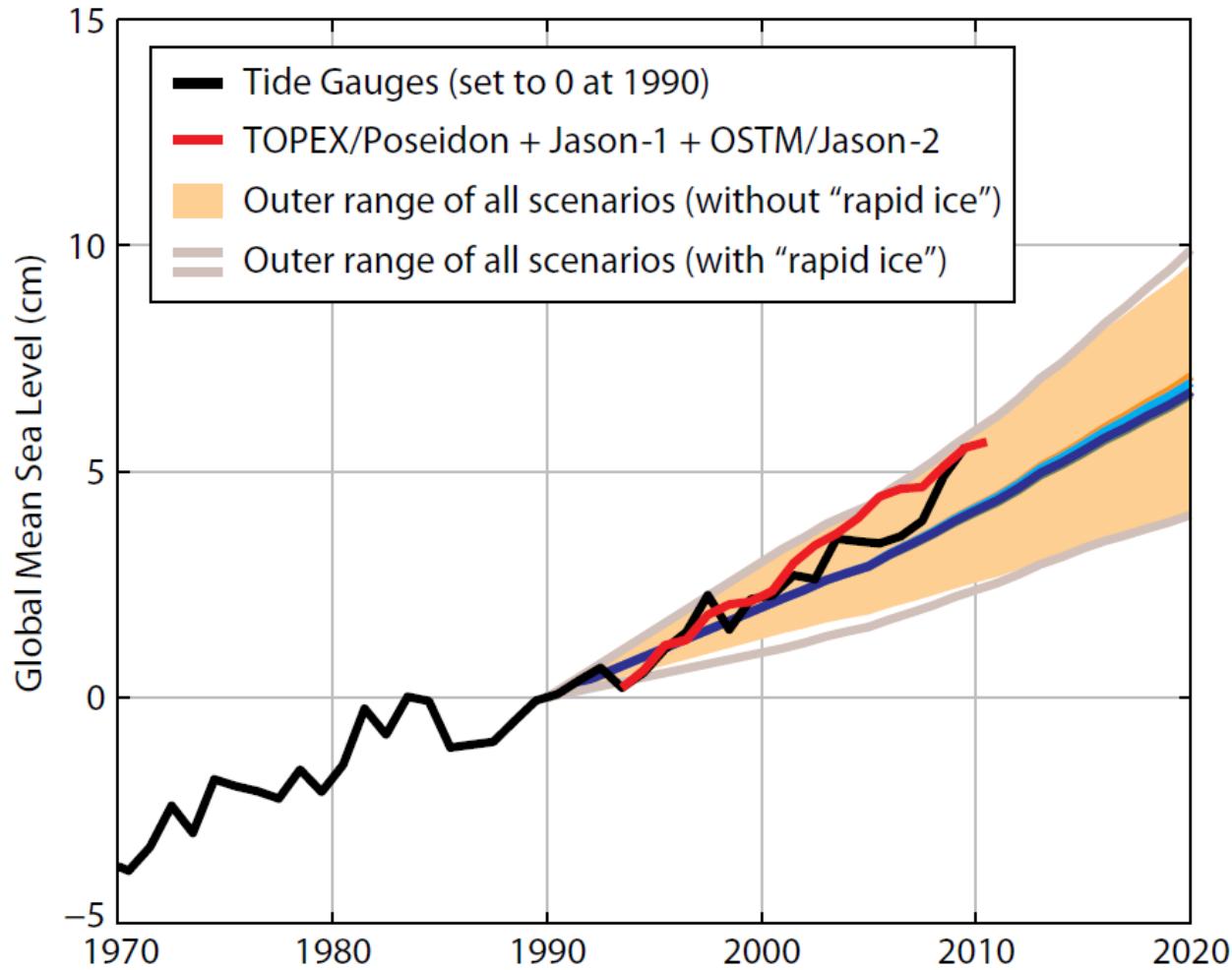
# Sea-level rise – this century?



# SLR tracking relative to a few credible scenarios

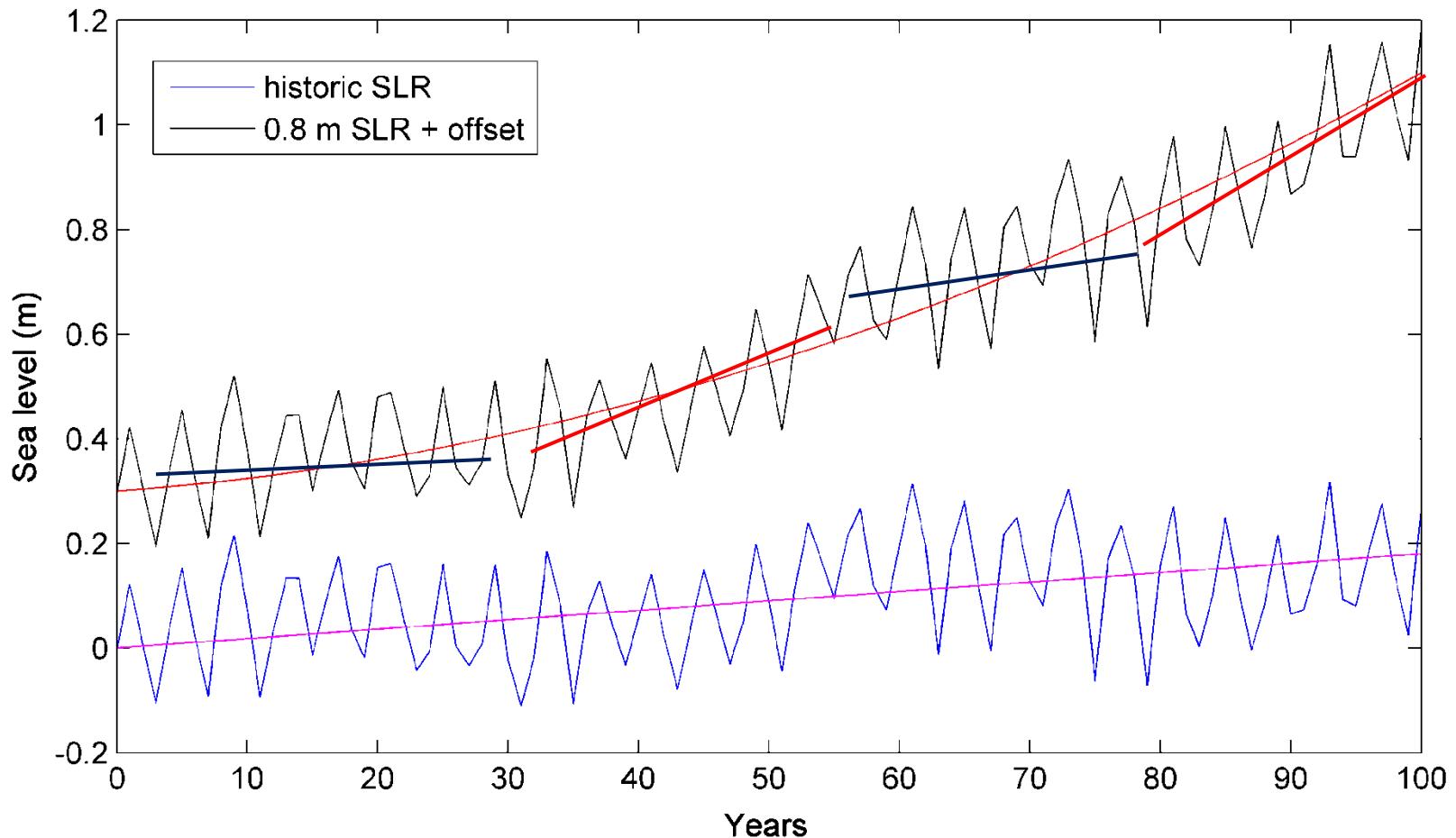


# SLR tracking relative to 2007 IPCC projections



Source: Church et al. (2011) *Oceanography*

# Not all smooth sailing: SL variability + short-term trends



# Implications for coastal communities



Tasman DC

# The future – *It's not just about sea-level rise*



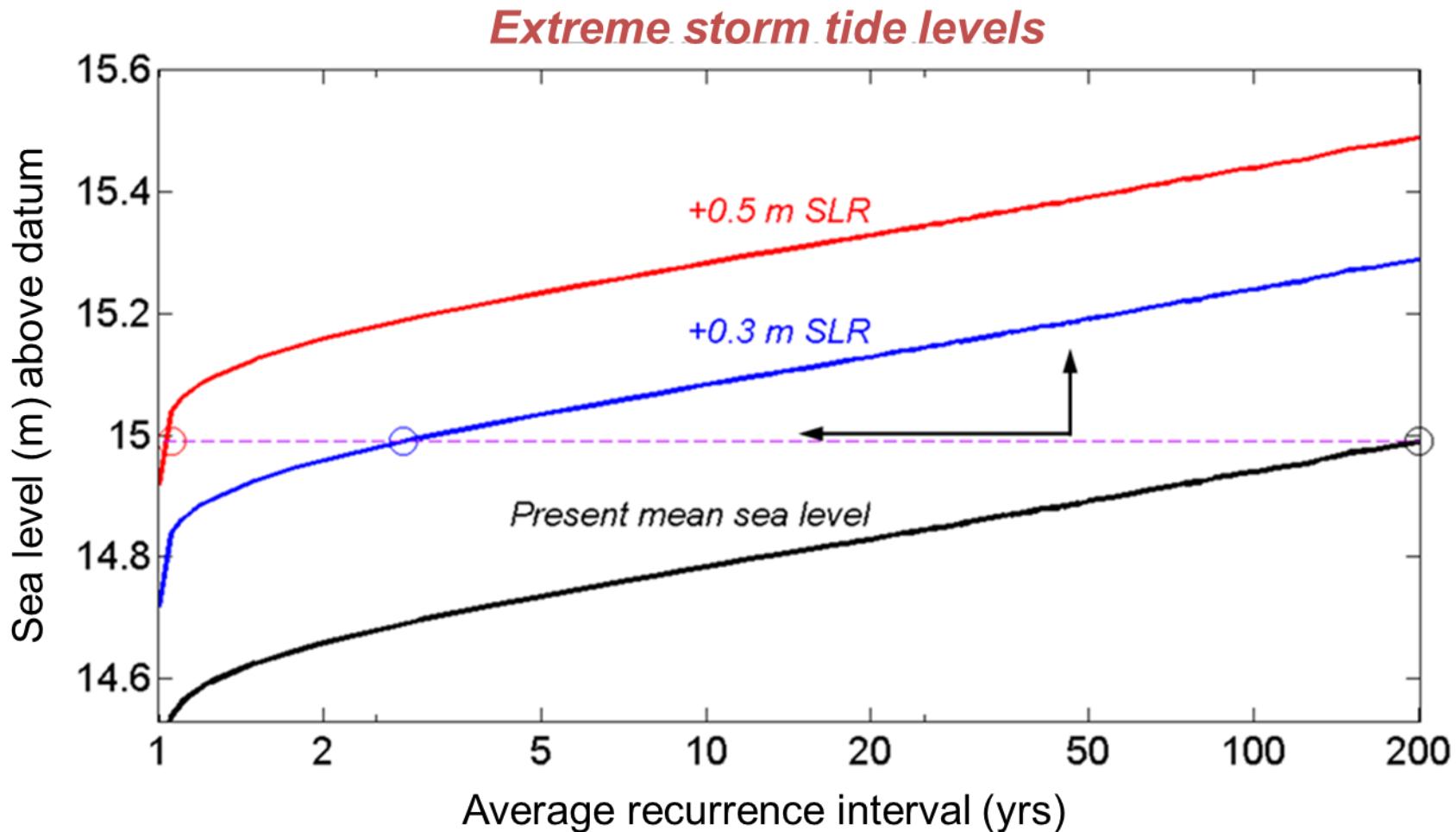
# Coastal erosion, overtopping



Inundation, drainage



# *More frequent storm-tides ... the next big issue*



*But what about:*

*wave height & surge (3-5cm by 2070-2100), wave direction & period, storm frequency?*

# NZ sea- level rise recommendations: (MfE Local Govt Guidance Manual & Summary)

For planning and decision timeframes out to the 2090's (2090-2099):

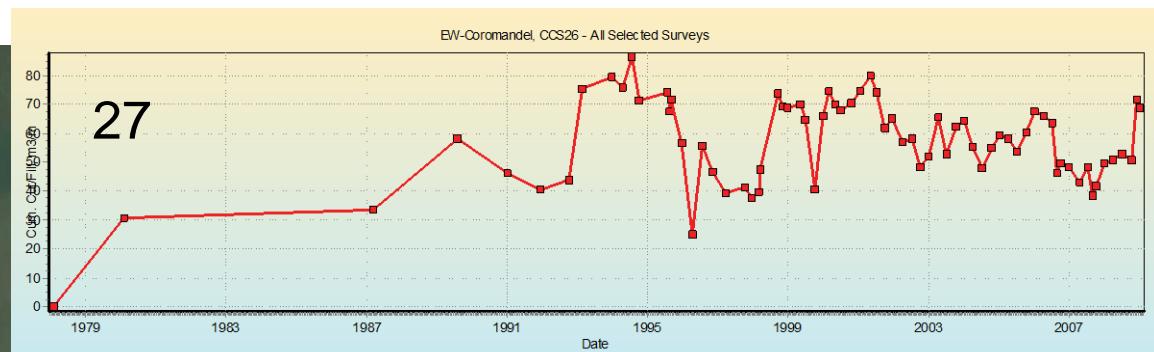
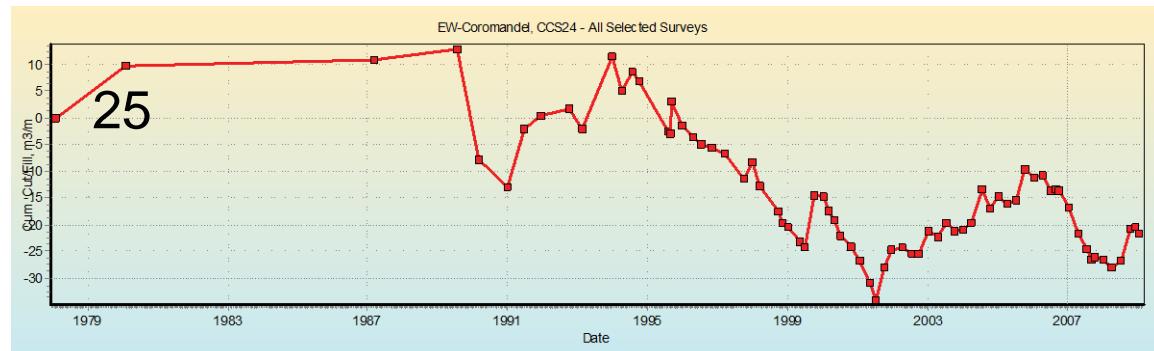
1. a base value sea-level rise of **0.5 m** relative to the 1980–1999 average be used, along with;
2. an assessment of potential consequences from a range of possible higher sea-level rise values. At the very least, all assessments should consider the consequences of a mean sea-level rise of at least **0.8 m** relative to the 1980–1999 average.

For planning and decision timeframes beyond 2100:

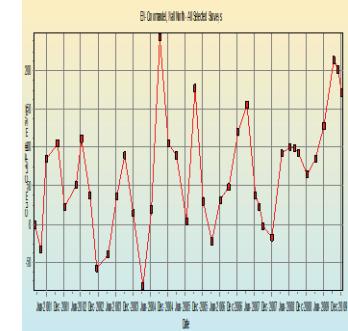
For longer planning and decision timeframes beyond the end of this century, we recommend an additional allowance for sea-level rise of **10 mm per yr.**



## Beach profiles 1979 - 2009



South wall



# The Bruun Rule of shoreline erosion

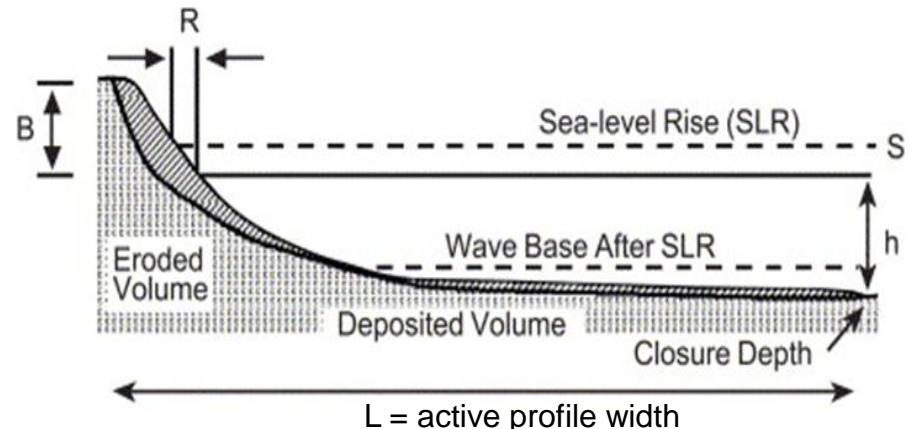
Bruun (1962) proposed a simple equation for the equilibrium shoreline retreat  $R$ , of sandy coasts that will occur as a result of sea-level rise  $S$

$$R = SL/(h+B)$$

The equation balances sediment yield. The actual seabed will need time to respond to a change in sea level.

## Issues

- Very simplistic analysis tool and difficult to validate
- Assumes no sediment is lost from the coastal system.
- Makes no allowances for gradients in the longshore or cross-shore transport of sand.
- Lack of simple alternatives



**Recommendation** - Treat BR predictions of shoreline retreat with caution – may be too high

Shoreline recession rate will increase in many places if the rate of sea-level rise increases

# What is Adaptation Planning?

- Adaptation involves undertaking actions to minimise threats or to maximise opportunities resulting from climate change and its effects
- Adaptation is also a social process involving the way people will respond to change
- It's a journey involving different steps over time
  - Refer to **Table 3.1 on p. 24 PTC**
- An Adaptation Plan is much broader and more strategic than for example RMA plans
- Possible actions that could be included in an Adaptation Plan are shown in **Table 6.1 on p.51 PTC**

# Step 1

## Awareness & Acceptance



# Step 1: Awareness and Acceptance

## *Aim of this step*

- **Build awareness and acceptance**
  - within your organisation and communities that climate change is serious
- **Build awareness of**
  - how and when climate change might impact your coastal communities (generic information)

# What you need to do

- Identify the key stakeholders & communities
- Put together an argument and provide motivation to act
- Communicate this to stakeholders
- Obtain agreement on funding of further work

# Ready to Move on?

- Your politicians and your communities have a reasonable level of awareness
- They have accepted that you need to do further work
- *This does not mean* that everyone has to buy-in at this step

# Step 1: Awareness & Acceptance

## Facts, tips and resources

### Key facts and drivers

- There are social and legal obligations to take climate change effects into account in community planning - potential for legal challenge and liability if these obligations are not met
- Will not get traction unless your politicians and communities have a reasonable level of awareness and acceptance
- There may be current hazard issues that will also drive awareness

# Step 1: Awareness & Acceptance

## Facts, tips and resources

### Tips

- Do an assessment of where you are now (e.g. a checklist of questions as per top of p31 in PTC)
- Decide on the level and scope of information required for political and community dialogue (e.g. considering the sorts of questions on lower part of p31 of PTC)
- How to get momentum?
  - Use staff/political/community champions
  - Ensure awareness of legal responsibilities and potential consequences of ignoring these
  - Get key climate change information in punchy format – communicate!!

# Step 1: Awareness & Acceptance

## Facts, tips and resources

### Tips

- Most important!!! Do not expect everyone to ‘accept’ climate change!
  - Be prepared for change (back-sliding) as circumstances change
  - Emphasise the benefits of action to reduce *existing* hazard risks
  - Provide evidence of what changes we can already see now – e.g. sea-level rise around New Zealand

# Step 1: Awareness & Acceptance

## Facts, tips and resources

### Useful resources

- Start with the resources listed in Box 4.2 on p30 of PTC (see also Appendix 3) and the materials from this seminar
- CACC webpage
- IPCC website (e.g. list on p89 of PTC)
- Review how other councils have approached similar work (e.g. Box 4.6, p35 of PTC)
- NZCCC SLR conference presentations on website—community conversations session

# Step 2 Assessment



# Step 2: Assessment

## *Aim of this step*

- **Gathering information**

to be better informed about the scope, scale and timeframes of potential impacts of climate change on your coastal communities

- **Identifying the likely changes**

and assessing the associated risks including community and ecosystem vulnerability

# What you need to do

- **Assess what issues you face**
- **Identify the areas that are potentially affected by coastal hazards**
  - Ensure you consider all the factors identified in **Policy 24 NZCPS**
- **Assess the level of risk** to these areas and how it may change over time
- **Prioritise** based on assessed vulnerabilities and resources available.

# **Policy 24 NZCPS: Identification of coastal hazards**

**Identify areas that are potentially affected by coastal hazards** (giving priority to areas at high risk of being affected)

**Hazard risks, over at least 100 years, are to be assessed having regard to:**

- (a) physical drivers and processes (i.e. understand how the natural system works!)
- (b) short-term and long-term natural dynamic fluctuations of erosion and accretion (you need also to assess any long term trends – but these are rare)
- (c) geomorphological character;
- (d) the potential for inundation – sources & pathways
- (e) cumulative effects of sea level rise, storm surge and wave height under storm conditions;

# Policy 24 NZCPS, cont'd:

- (f) influences that humans have had or are having on the coast;
- (g) the extent and permanence of built development;
- (h) the effects of climate change on
  - (i) matters (a) to (g) above;
  - (ii) storm frequency, intensity and surges; and
  - (iii) coastal sediment dynamics;

taking into account national guidance and the best available information on the likely effects of climate change on the region or district.

# Ready to Move on?

- You have conducted a risk assessment and identified your priority areas
- You have political acceptance of the need to plan a strategic way forward

## Step 2: Assessment

# Guidance, tips & resources



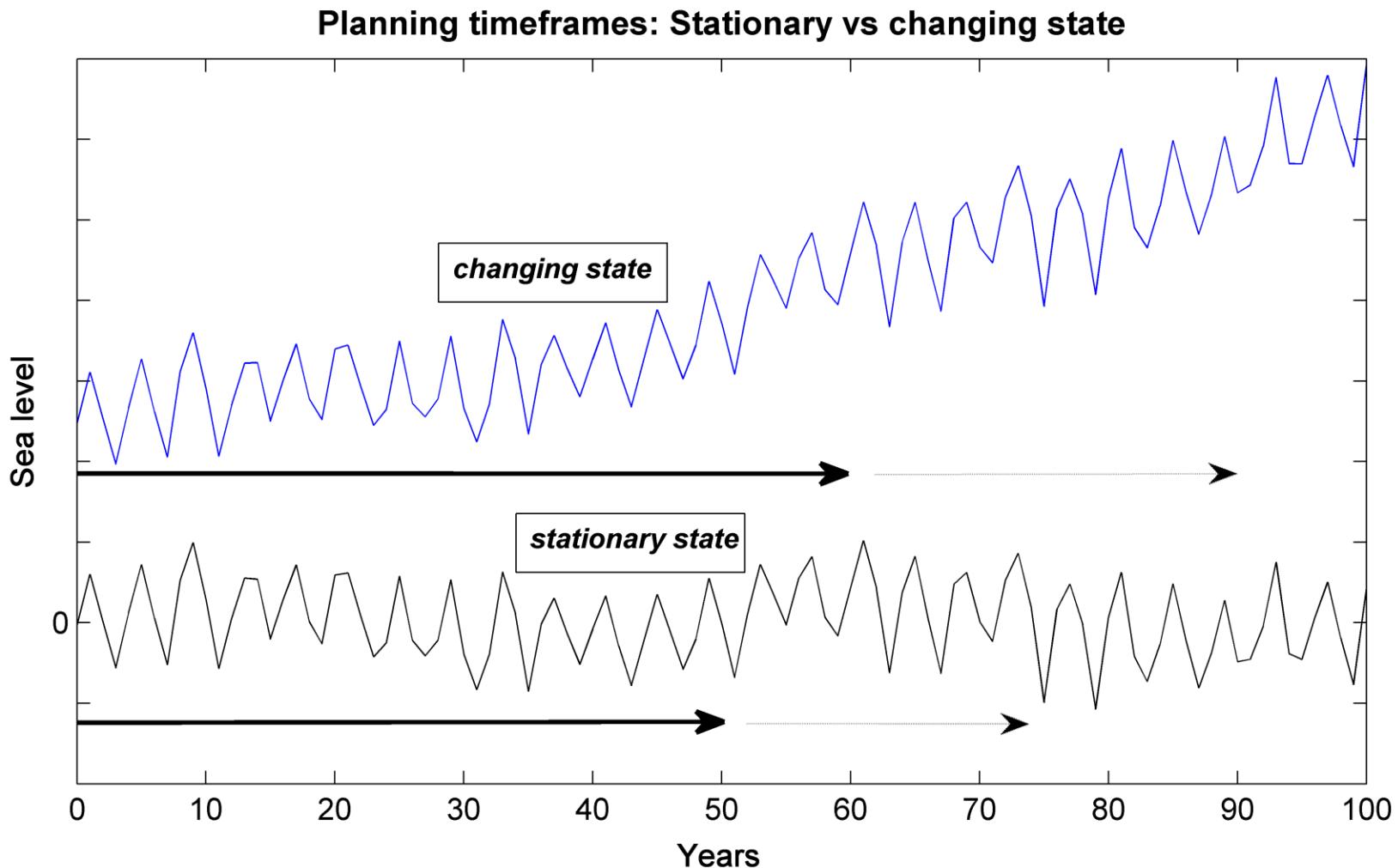
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- Key facts and guidance
- Tips
- Useful resources

# Guidance on SLR to accommodate



# Planning timeframes: now essential!!



# Guidance on sea-level rise to accommodate



MfE guidance Manual for Local Government in NZ (2008):

- Largely based on IPCC AR4
- But also included Table 2.2: projections from peer-reviewed papers (2007-2008 )
- Risk-based approach

<http://www.mfe.govt.nz/publications/climate/coastal-hazards-climate-change-guidance-manual/>

<http://www.mfe.govt.nz/publications/climate/preparing-for-coastal-change-guide-for-local-govt/index.html>

# Guidance on sea-level rise to accommodate

For planning and decision timeframes out to the **2090's** (2090-2099):

1. a base value sea-level rise of **0.5 m** relative to the 1980–1999 average be used, along with;
2. **an assessment of potential consequences from a range of possible higher sea-level rise values.** At the very least, all assessments should consider the consequences of a mean sea-level rise of at least **0.8 m** relative to the 1980–1999 average.

For planning and decision timeframes **beyond 2100**:

For longer planning and decision timeframes beyond the end of this century, we recommend an additional allowance for sea-level rise of 10 mm per year beyond 2100.

# Issues with MfE SLR Guidance (1)

- Application has tended towards extracting only the two SLR tie-point values from the overall risk framework – especially for planning instruments (e.g. RPS)
- Understandable, as a risk-based approach requires knowledge of hazard exposure & consequences – local and regional, which is slowly being gathered e.g. RiskScape, Wellington CC project
- By focusing on just the SLR tie-points, MfE guidance is perceived as being out of date by some councils (and too conservative by others).

# Issues with MfE SLR Guidance (2)

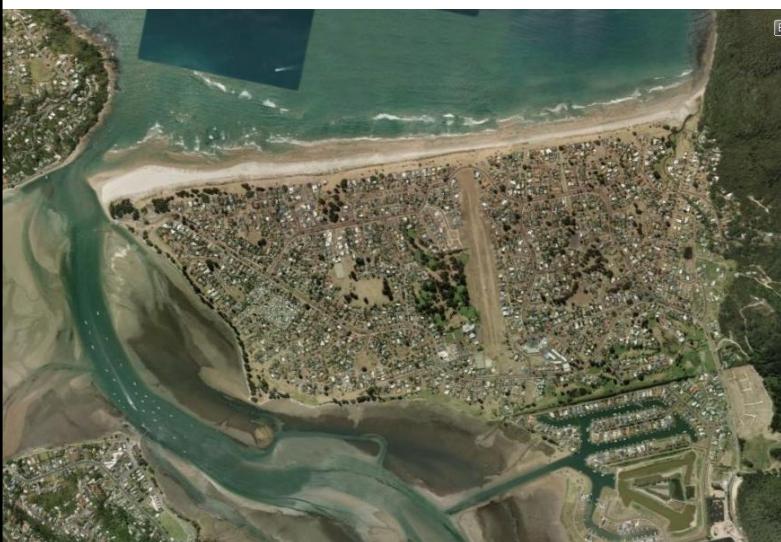
- IPCC AR4 timeframe out to the 2090s (average of 2090–99) is often misinterpreted as being for 2100 – besides we need to extend further (NZCPS) - so MfE Guidance is out of kilter in terms of planning timeframes in the NZCPS
- Sea-level rise projections have become more uncertain with respect to TIMEFRAMES, because of potential tipping points in polar ice-sheet discharges and more aspects being built into complex ocean-climate-ice models
- One way to deal with uncertainty is take a risk-based approach, complemented by adaptive management & staged planning in conjunction with regular monitoring & review

# International SLR planning guidance

State	SLR guidance	Timeframe
Queensland	0.8 m	2100
NSW	0.9 m	2100
Victoria	$\geq 0.8$ m	2100
South Australia	1.0 m	2100
West Australia	0.9 m ( <i>was 0.38 m</i> )	2110
Tasmania	TBD	
NT	TBD	
UK Env Agency scenarios	0.12-0.76 m	2095
UK Env Agency H <sup>++</sup> scenario*	0.93-1.9 m	2100
Thames Estuary 2100 flood-risk	0.9 m (for timing)	2100
Delta Commission - Netherlands	1.1 m	2100

\* for contingency planning & limits on adaptation

# Greenfields v's existing development

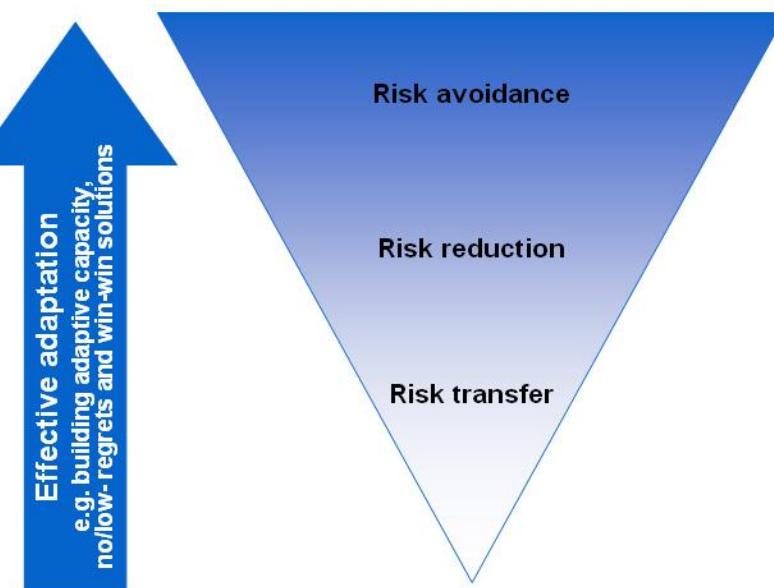


New “Greenfields” development:

- Risk avoidance and precautionary approach paramount (NZCPS)

Existing development:

- Determining an appropriate “mix” over a particular timeframe and associated potential SLR.
- Much more complex!!!



# Suggested guidance on accommodating SLR

- Risk assessment should be based on a **broad consideration of potential consequences** (direct impacts, loss of assets, amenity, community values etc) and likelihood of SLR (e.g., Wellington City vulnerability study look at impacts of 0.5, 1.0 and 2 m SLR)
- Extends out planning timeframe – “at least 100 years” translates out to ~2115 (not 2090s) and have taken into account present tracking of relative SLR in NZ and also the global-average SLR relative to past IPCC projections
- Is there any need to consider an additional component of relative sea-level rise for tectonic subsidence e.g., Wellington region, Thames?, but will usually require further monitoring and assessment
- Keep monitoring & tracking progress of **relative SLR** for each region

# Suggested guidance on accommodating SLR

- ***Existing development:***

- ✓ Plan generally for a sea-level rise of around **1.0 m by 2115** based on present tracking of NZ and global SLR (equivalent to 0.8 m by 2090s)
- ✓ If the risk or consequences of SLR can be shown to be limited in time or minor, then apply a smaller sea-level rise e.g. 0.7 – 0.9 m by 2115, or if risk is high then should consider rises above 1 m by 2115

## Communicate risk & uncertainties

- ***New Greenfields development (e.g. new subdivision):***

- ✓ Plan for at least **1.5 m** (irrespective of timeframe but a minimum of 100 years) as sea levels will carry on rising for several centuries
- ✓ If the risk or consequences are limited or isolated, cautiously apply no less than 1.0 m
- ✓ For new development eventually exposed to SLR of 2+ metres (e.g. by early to mid 2100s) – should incorporate future-proofing elements into building requirements e.g., piled floors – not poured slabs (also co-benefit with improved tsunami protection)

# Quick overview on SLR for adaptation plans

- ❑ Sea level doesn't rise steadily – need to account for variability:
  - recent increase in short-term trend due primarily to variability
  - variability may mask SLR rate over next few decades – so monitor!
- ❑ Relative SLR trends in NZ similar to the global average
  - can adopt global projections until monitoring shows otherwise
- ❑ Sea-level rise poised at present – ice-sheet contribution increasing -
  - but will need to see a large increase soon to get >1 m by 2100
- ❑ The IPCC 5<sup>th</sup> Assessment Report due out Sept 2013 – but don't wait until then to get started (uncertainty will still be there!)
- ❑ Risk assessment approach complemented by adaptive planning is useful way to incorporate on-going uncertainty in SLR

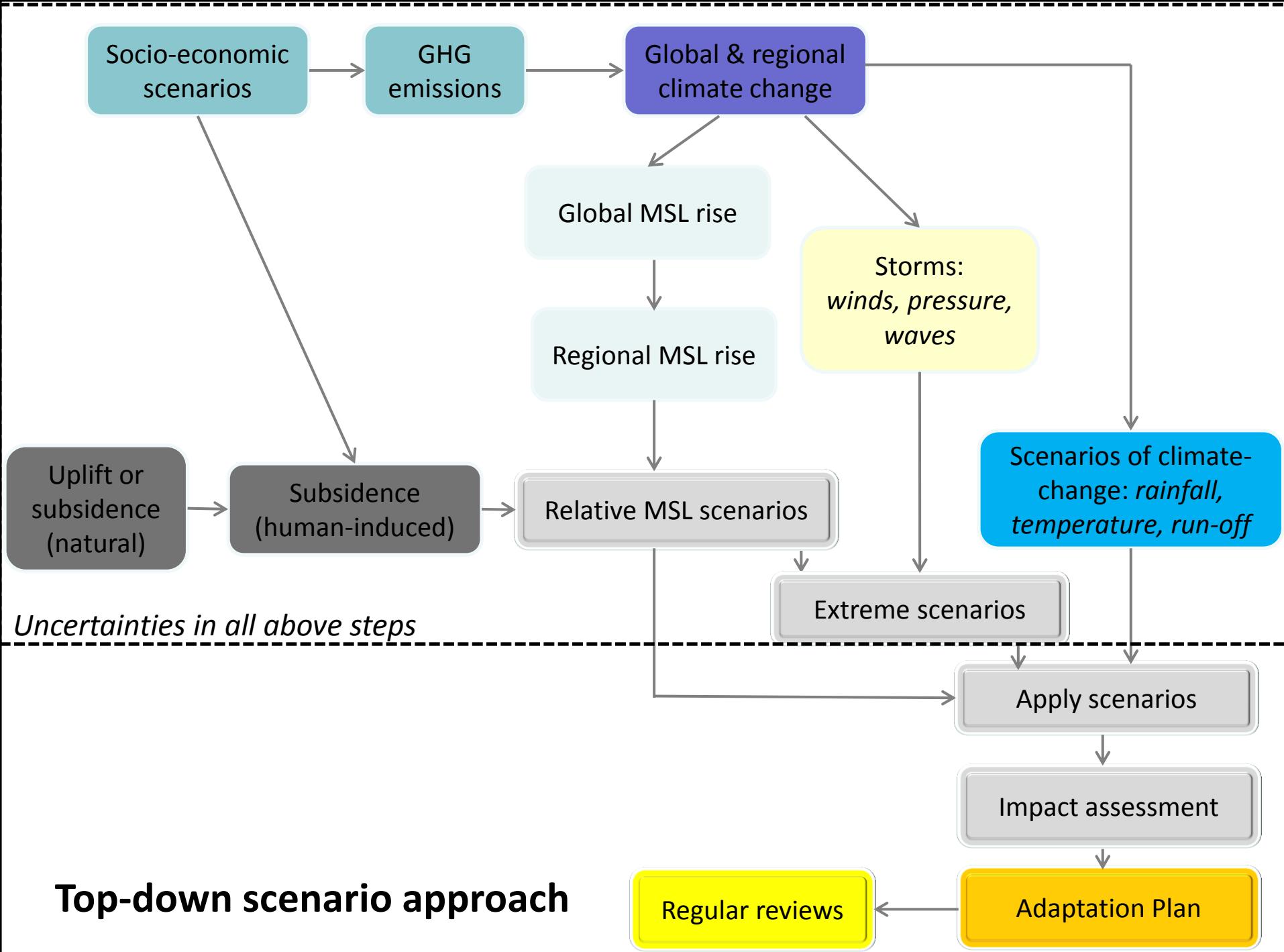
# Risk or vulnerability assessments

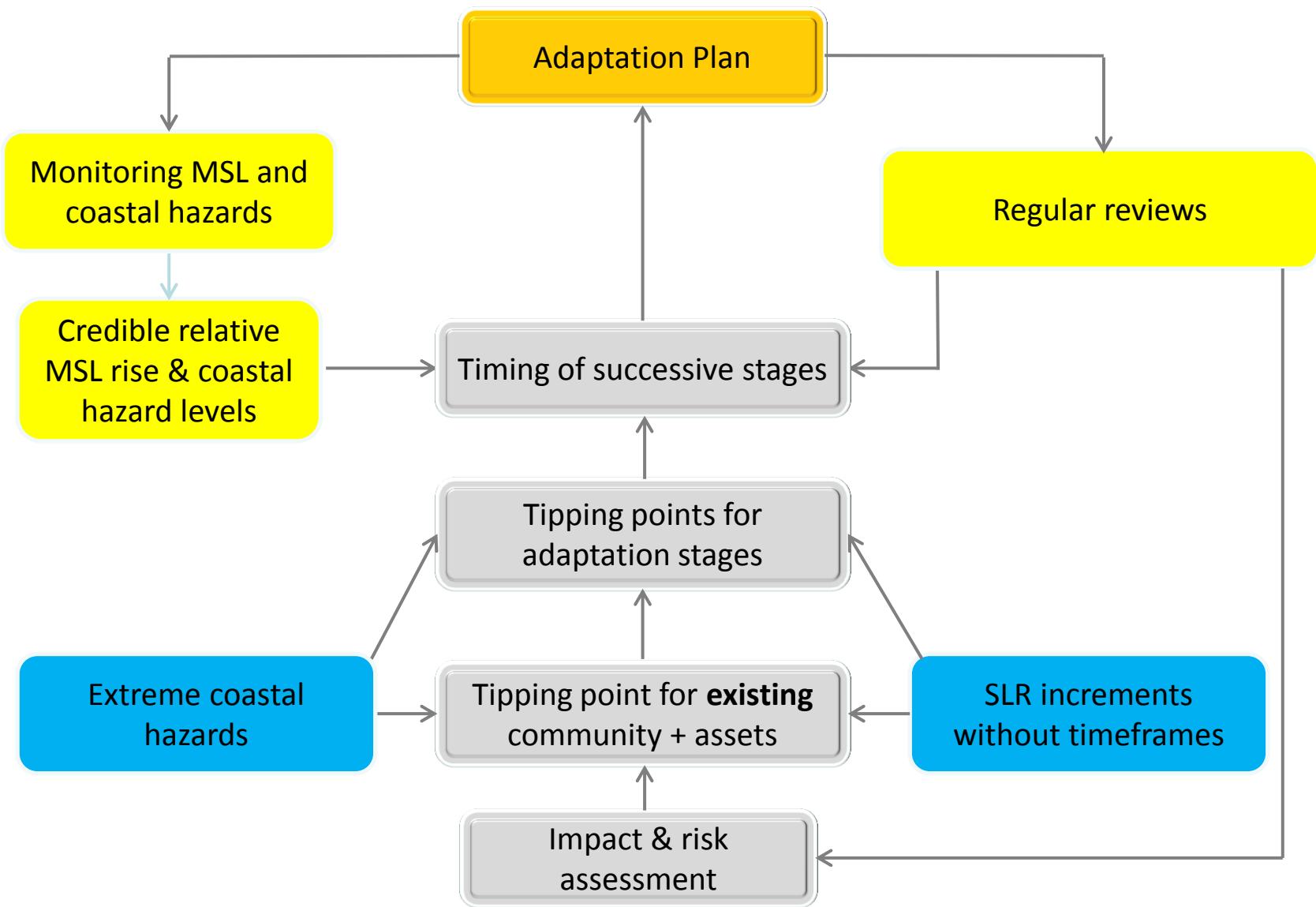
## Top-down scenario approach

- Develop the most credible relative sea-level rise for the region
  - Downscale from global absolute SLR
  - Incorporate regional and local differences
  - Communicate uncertainties in scenarios
- Undertake vulnerability and risk assessments
- Best suited for Greenfields or existing development which can't be staged

## Bottom-up tipping-point approach

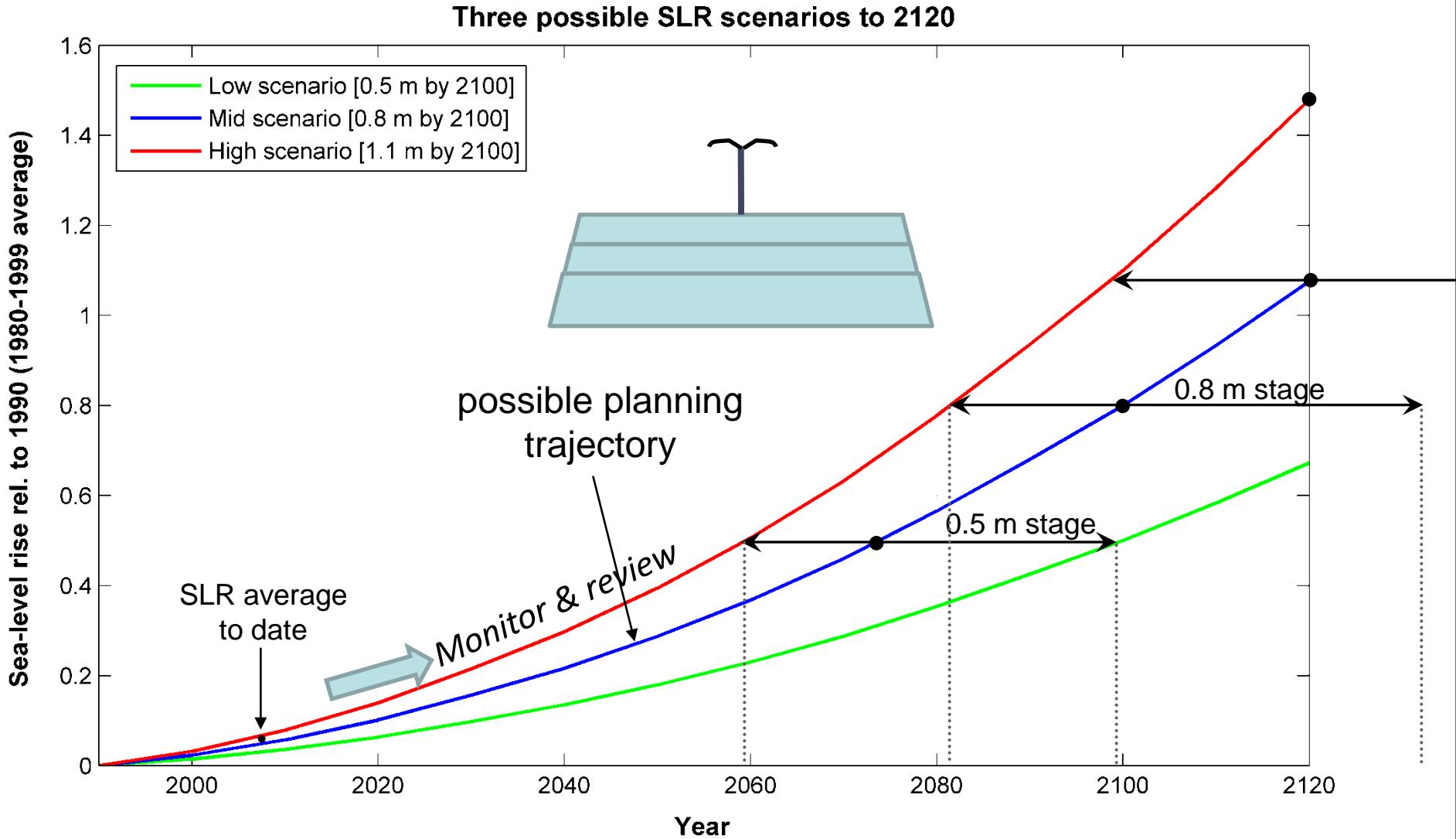
- For a range of increments in relative sea-level rises for a locality
  - Find the critical SLR + coastal-hazard tipping point for present community
  - Determine SLR for implementing subsequent stages
  - Timing of the various stages based on a most-likely SLR trajectory, which is revised following regular monitoring & reviews
- Undertake vulnerability and risk assessments
- Best suited for existing development, especially where adaptation can be done in stages





## Bottom-up tipping-point approach

# Example: Adaptive management approach to design – circumvents uncertainty in SLR projections





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Time to change speaker

# Useful resources

- MfE Guidance Manual 2008/09 - presently best information & guidance
- Impacts of Climate Change on Urban Infrastructure and the Built Environment Tool Box – see pp.42–43 of PTC
- Technical papers and website resources - see pp.99100 of PTC.
- NZ Climate Change Centre conference *Sea-level rise: meet the Challenge* talks– esp. Bell/Ramsay, Manning, Reeder etc  
<http://www.confer.co.nz/nzccc2012/programme.htm>
- Geo-referenced photographs, maps and LiDAR
- Coastal Explorer web-tool supported by NZCoast web pages
- NIWA web site on sea-level rise (in prep)
- Coastal Hazards Guidance Manual (Envirolink): in prep. by Doug Ramsay & co.

# Geo-referenced photographs, maps, LiDAR



*What are the things that you value that may be affected by climate change?*

## Coastal inundation and drainage

High tide



## Whitianga

- Inundation and drainage issues with exposure to changing water levels
- Aerial photo, LiDAR topo, sea levels
- MHWS levels – present day, 2050s and 2090s
- 1% Annual Exceedance Probability (AEP) or 100 yr Average Recurrence Interval (ARI) storm-tide event

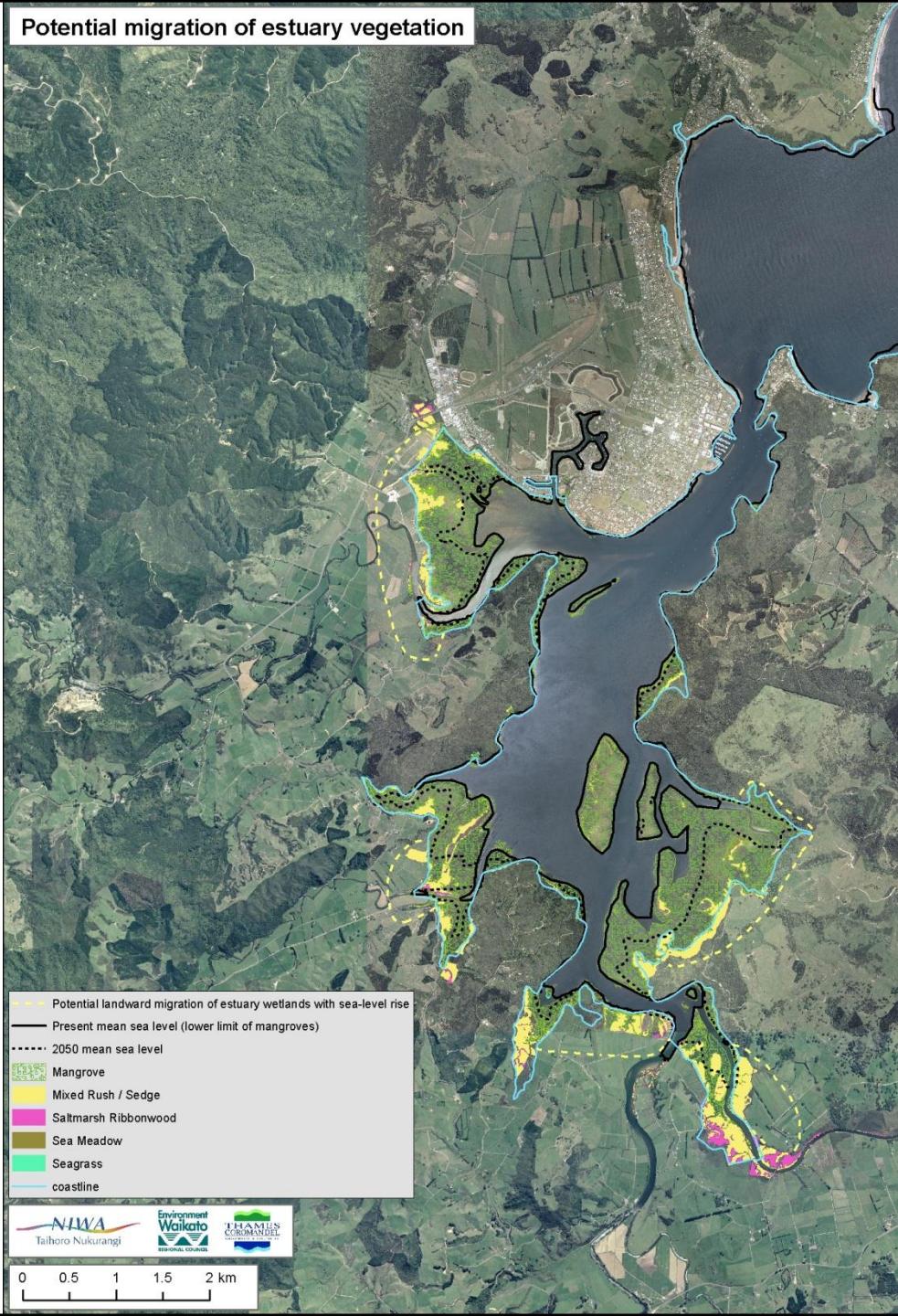
## Coastal change



## Whitianga

- Where will temporary or permanent cutback take place under the worst likely storms
- 1% Annual Exceedance Probability (AEP) or 100yr Average Recurrence Interval (ARI) for erosion events
- 3 scenarios
- Present day (yellow) and primary development setback
- 2050s (pink) 0.35m SLR
- 2090s (red) 0.8m SLR

### Potential migration of estuary vegetation



## Whitianga

- Potential habitat change in mangroves and salt marsh
- 2 scenarios
- Present day (black)
- 2050 (dotted) 0.35m SLR

# NZCoast & Coastal Explorer web interface

NIWA  
Taiboro Nukurangi

Science Services News & Publications Education & Training Events About

Home > Science > Coasts and Oceans > Tools and Resources > NZCoast

How you got here

Click to see full navigation path to this section

**NZCoast**

Science Centres: Coasts and Oceans

NZCoast has been established as a portal for information relevant to the New Zealand coastal environment and its associated hazards.

The primary aim of NZCoast is to give resource managers robust, higher level information on the coast to inform decision-making, and provide the public with educational information and resources.

NZCoast went live on the 1st July 2008. The information you currently see on the site represents only Phase 1 of this project. In Phase 2 we plan to revise the content and layout of the web-site, add additional information, revise the layers in Coastal Explorer and add tool and visualisations. The site is continually under development and we welcome your questions, queries and feedback.

About NZCoast

NZCoast has been established as an information portal for information relevant to the New Zealand coastal environment and its associated hazards.

Coastal Explorer

Coastal Explorer is a GIS-based web-accessed classification and database for the New Zealand coast.

Tools and Visualisations

This section provides links to a variety of tools and visualisations created by NIWA and other organisations to help different users of the coastal environment make informed decisions on coastal management and also answer common questions for the coastal environment.

- Navigate and zoom
- 1:50,000 scale maps
- Switchable layers
- Pop ups

<http://wrenz.niwa.co.nz/webmodel/coastal>

**Coastal Explorer**

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Map Satellite Terrain

Coastal Beach Monitoring Estuary Coast Care Storm&Wave

All Beach types Wave dominated beaches Tide modified beaches Tide dominated beaches

Refresh Map Definitions Map key Quick find

Beach hazards and rating: Refers to the scaling of a beach according to the physical hazards associated with its beach type under normal wave conditions, together with any local physical hazards. It ranges from the low, least hazardous rating of 1 to a high, most hazardous rating of 10. It does not include biological hazards, such as sharks.

Beach ridge barrier plain: A sequence of (relict) ridges separated from the shoreline by progradation (representing a successive positions of an advancing shoreline (also called a strandplain).

Beach ridge barrier: A single low, essentially continuous mound or ridge of beach material predominantly built by the action of waves (swash) on the backshore of a beach, and occurring singly or as one of a series of approximately parallel deposits. Generally composed of coarse sandy, pebbly, cobble and/or shelly material.

Beach type: Refers to the prevailing morphology (modal state) of a beach, including the waves and currents, the extent of the nearshore zone, the width and shape of the surf zone, including its bars and troughs, and the dry or subaerial beach.

Beach: Consists of a narrow backshore and foreshore (the part of the...

# Beaches and their hazard rating

Beach type

Matata

Awaateatua Beach, Bay of Plenty

NZ 260 Map Series: Q15 6361763, 2841022  
Latitude/Longitude: -37.886259, 176.761933

Characteristics: Sandy beach backed by a large vegetated dune system.  
 Access: Good vehicle access and parking. 4 controlled and 3 uncontrolled pedestrian access points to the beach.

**Beach Type & Characteristics**  
**Low Tide Terrace**  
Moderately steep beach face joined to an attached bar or terrace exposed at low tide. The bar extends alongshore, is flat and featureless, or cut every several 10's of metres by small rips. Breakers 0.5-1.0 m high. Beach composed of fine to medium sand. Commonly occur in areas sheltered from direct wave attack.

**Beach Hazards and Rating**  
Generally safe bathing, safest at low tide, but when swimmers should watch for plunging waves. Most hazardous at mid to high tide, when waves exceed 1 m and are driven oblique to shore by sea breezes.

WAVE HEIGHT	<0.5	0.5	1.0	1.5	2.0	2.5	3.0	>3.0
BEACH TYPE	3	3	4	6	6	7	8	10
Low Tide Terrace	3	3	4	6	6	7	8	10

All Beach types  
Wave dominated beaches  
Tide modified beaches  
Tide dominated beaches

Definitions Map key Quick find

**Beach hazards and rating:** Refers to the scaling of a beach according to the physical hazards associated with its beach type under normal wave conditions, together with any local physical hazards. It ranges from the low, least hazardous rating of 1 to a high, most hazardous rating of 10. It does not include biological hazards, such as sharks.

**Beach ridge barrier plain:** A sequence of (relict) ridges separated from the shoreline by progradation representing a successive positions of an advancing shoreline (also called a strandplain).

**Beach ridge barrier:** A single low, essentially continuous mound or ridge of beach material predominantly built by the action of waves (swash) on the backshore of a beach, and occurring singly or as one of a series of approximately parallel deposits. Generally composed of coarse sandy, pebbly, cobble and/or shelly material.

**Beach type:** Refers to the prevailing morphology (modal state) of a beach, including the waves and currents, the extent of the nearshore zone, the width and shape of the surf zone, including its bars and troughs, and the dry or subaerial beach.

# Storm surge

## Coastal Explorer

Drag Zoom

Map Satellite Terrain

Coastal Beach Monitoring Estuary Coast Care Storm&Wave

Modelled sites

Storm surge/Wave

Refresh Map

Definitions Map key Quick find

**Beach hazards and rating:** Refers to the scaling of a beach according to the physical hazards associated with its beach type under normal wave conditions, together with any local physical hazards. It ranges from the low, least hazardous rating of 1 to a high, most hazardous rating of 10. It does not include biological hazards, such as sharks.

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# Hinterland characteristics

## Coastal Explorer

Drag Zoom

Map Satellite Terrain Overlays

Coastal Beach Monitoring Estuary Coast Care St

Whanganui Inlet

Ruataniwha Inlet

Collingwood

Aorere

Golden Bay

Tata Beach

Ponara

Tarakohe

Abel Tasman National Park

Coastal features

- Beach exposure
- Foreshore sediment type
- Hinterland characteristics
  - Lagoon/estuary/river
  - Low plain - dry
  - Low plain - wet
  - Rising ground
  - Sea cliff active
  - Sea cliff fossil

Refresh Map

Definitions Map key Quick find

Lagoons/estuary/river: The area behind the beach is a lagoon, estuary or river.

Longshore bar and trough: Consists of a shore parallel bar separated from the beach by a deep trough. Breakers 1.5-2.0 m high. Moderate rip currents. Straight beach composed of medium sand with moderate to steep beach face and cusps.

Low energy coast: A shoreline that is sheltered from large waves and long period waves. Occur in gulfs and behind islands and reefs on the open coast.

Low lying plain - Drained: The land backing the beach is very low lying (near or below sea level) but is drained (cut with drains).

Low lying plain - Dry: The land backing the beach is very low lying (near or below sea level) but is dry.

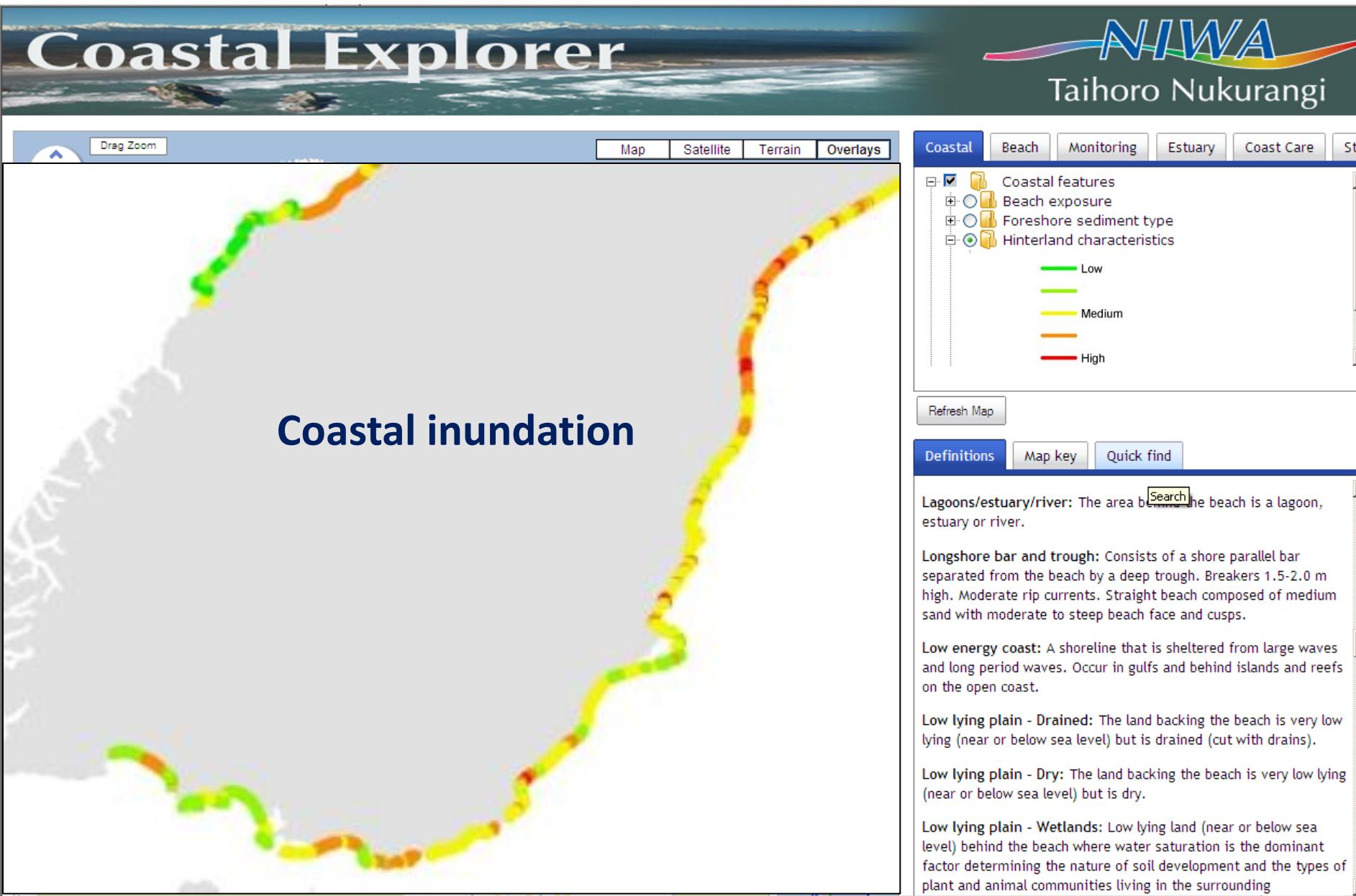
Low lying plain - Wetlands: Low lying land (near or below sea level) behind the beach where water saturation is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the surrounding

# Coastal sensitivity – *under development*

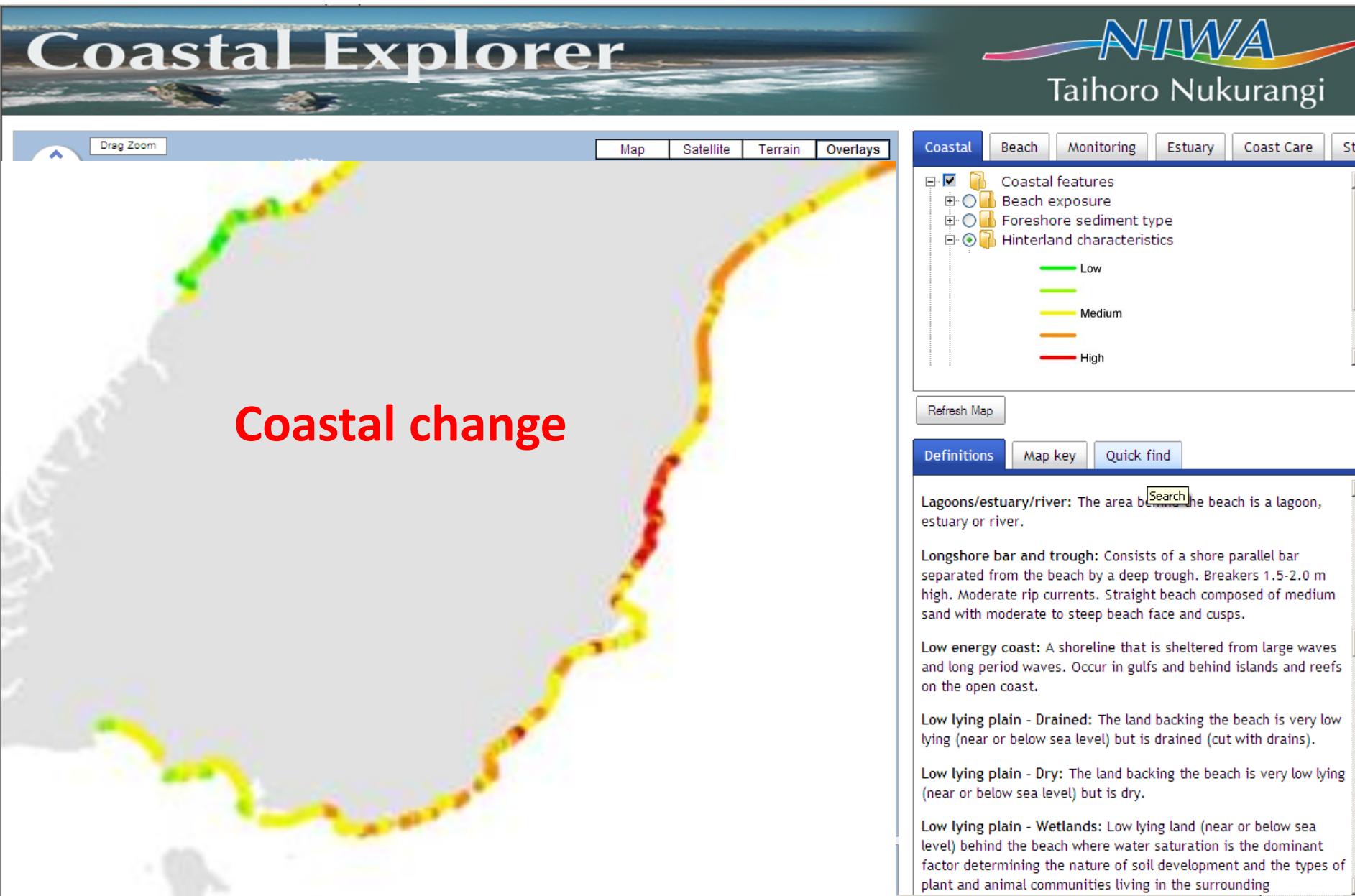


- Broad scale maps of relative sensitivity of the coast to inundation and coastal change (erosion and accretion) with climate change
- For unconsolidated shoreline on open coast
- Based on: Exposure, Oceanography (TR, surge, wave height), Geomorphic setting/features, Beach sediment type, Hinterland characteristics, Shoreline stability
- Mapped in GIS at 1:50000 scale

# Relative sensitivity to inundation under CC



# Relative sensitivity to inundation under CC



# Website on sea-level rise - *under development*



The image shows the top navigation bar of the NIWA website. It features the NIWA logo with the Māori name 'Taihoro Nukurangi'. The navigation menu includes links for Staff Login, Media Centre, and Careers with NIWA. A search bar with a magnifying glass icon is also present. Below the main menu, there are secondary navigation items: Science (selected), Services, News & Publications, Education & Training, Events, and About. At the bottom left, a breadcrumb trail shows 'Home > Science > Climate'.

- Measuring sea-level rise
- Historic and future projections and the components causing SLR
- How SLR in New Zealand fits within the context of global average rates of rise
- Planning for sea-level rise
- FAQ's
- References and web links



# Step 3

## Planning a Way Forward



# Step 3: Planning a Way Forward

## *Aim of this step*

- Develop a **strategic and long term approach** to adaptation
- Sets an **overall context** including drawing together **community aspirations**
- Start process of change ie **embedding adaptation** into all areas of council and community decision-making
- **Iterative process**

## p.46 *Pathways to Change*

**“Very few people would deny that, in today’s fast-moving fast-changing business world, strategy, with its long-range perspective, is critical.**

**By analogy, if the guidance system on an airplane or ocean liner is not programmed to reach its destination, then it cannot keep the plane or ship on course in rough or stormy weather.**

**For any company today, strategy provides, or should provide, that overall trip plan against which management can true up in difficult times.”**

**(Guowitz, 2007)**

# What you need to do

- **Develop a vision** of what you want your community to look like in the future
- **Identify and assess feasible and sustainable adaptation options** (short and longer term)
- **Work with key stakeholders and communities** to decide the best way forward
- **Identify preferred actions** with priorities/ timeframes, responsibility and indicative costs

# Ready to Move on?

- You are **clear about your communities vision** for adaptation
- You have **identified the preferred set of adaptation actions** together with timelines
- You have **commitment from Council** for resourcing implementation
- You have **political and community support** for the actions

# Step 3: Planning a Way Forward

## Facts, tips and resources

Key drivers of this stage include:

- **Legislative requirements** (summarised in Step 1)
- **Awareness** that the potential risks and costs of failing to adapt are significant for your communities
- **Local issues** that drive demand for action and reinforce the need for adaptation
- **Community and political demand** for action to build community resilience

# Step 3: Planning a Way Forward

## Facts, tips and resources

### Tips

- Significant barriers and challenges – don't jump to this step without adequate work in Steps 1 and 2
- Adaptation is not just about imposing directions, need individuals/communities to adopt directions
- About the process of community change – need to engage to move awareness and expectations and promote adaptation (think human dimension)
- Research has consistently found that the most important adaptations are those that improve people's ability to cope with adversity and change (cf. technological changes)

# Step 3: Planning a Way Forward

## Facts, tips and resources

### Tips

- Align different work areas and leverage/coordinate resources – all stakeholders need to be going in the same direction
- Adaptation requires institutional arrangements that
  - support flexibility
  - enhance co-ordination
  - promote consideration of the longer term and broad-scale processes driving systemic change (natural and human)
  - provide platforms for social learning (e.g. connecting communities with their environments – Beachcare, etc)
- *“Failure in adaptation can be attributed to rigid, undiversified, and self-reinforcing institutions”* (Ealin and Patt, 2011)

# Step 3: Planning a Way Forward

## Facts, tips and resources

### Tips

- Both human systems and natural systems need to be addressed
- i.e. Building social and ecological resilience
- Short-termism amplifies immediate needs and significantly under-rates ecological and longer term considerations
- Short-termism inevitably makes the larger social ecological system more vulnerable in the longer term
- Making the resilience of an entire social ecological system a priority in adaptation policy is difficult to implement in practice but essential
- It is hard work but it pays off (e.g. Muriwai coastal hazards)

# Step 3: Planning a Way Forward

## Facts, tips and resources

### Tips

- Adaptation is a dynamic and continuous process rather than an outcome
- Not just a matter of identifying appropriate interventions but also how the barriers to implementation will be addressed
- You must know & define how adaptation policies will be implemented on the ground (otherwise they probably won't be)
- *The focus on risk assessment and associated technological interventions in the industrialized world illustrates the difficulty of addressing underlying structural and cognitive barriers to change, as well as the policy implications of conceptualising adaptation as an outcome rather than a dynamic process*  
*(Eakin and Patt, 2011)*

# Step 3: Planning a Way Forward

## Tips cont'd:

### Tipping Points in Adaptation Strategies:

- The high uncertainties associated with climate change can make it difficult to identify appropriate specific actions or interventions
- At any point in time, there are also numerous limitations on what is practical or feasible
- An “adaptation tipping-point” approach can be very useful in managing these uncertainties and limitations
- i.e. Assess & agree how much change (sea level rise, erosion, etc) can be absorbed before the next stage of adaptation needs to occur (i.e. triggers or thresholds for successive stages in adaptation)

# Step 3: Planning a Way Forward

## Tips cont'd:

### Tipping Points in Adaptation Strategies:

- Adaptation stages can then be pegged to specific magnitudes of change (e.g. sea level rise, erosion) rather than particular timelines
- Manages uncertainty and ensures costs are only incurred when they need to be
- However, tipping points need to allow sufficient lead in time
- The approach also needs to be under-pinned by robust monitoring and review process (discussed later in Step 4)
- Example: Thames Barrier approach – Box 6.6, p 54 PTC

# Step 3: Planning a Way Forward

## Facts, tips and resources

### Useful Resources

- Examples from other sites/bodies (e.g. Boxes 6.2-6.4, p 49 of PTC)
- Lists of adaptation actions that need consideration (e.g. Table 6.1 pp.51-53 of PTC)
- Resources outlined on pp.101-104 of PTC
- Adaptation Tool Kit: Sea-level Rise and Coastal Land Use (Oct 2011):  
<http://www.georgetownclimate.org/adaptation-tool-kit-sea-level-rise-and-coastal-land-use>

# Step 3: Planning a Way Forward

## Useful Resources cont'd

- A strategic approach to dialogue and consultation (e.g. “Dialogue-Debate-Negotiation” approach of J Forester can be useful in contentious situations)
  - Dialogue: Building/seeking understanding and knowledge of each other
  - Debate: Establish or refute arguments (facts & justification)
  - Negotiation/Co-operation: Agree a way forward

See also: Forester, J. (2009). *Dealing with Differences: Dramas of Mediating Public Disputes*. New York: Oxford University Press.

- Land and Water Forum 2012 report
  - Collaborative approach to planning for freshwater, which has useful parallels

# Step 4

## Implementation, Monitoring & Review



# Step 4: Implementation, Monitoring & Review

## *Aim of this step*

- **Implementing actions identified** in the adaptation plan
- **Monitoring implementation and changes** being achieved
- **Monitoring key natural changes** (e.g. for triggers)
- **Reviewing** the plan to keep it a live document

**You want to ensure the plan is being implemented, is effective and is kept relevant and up to date**

# What you need to do

Establish and implement an appropriate **monitoring and review framework** to:

- Ensure the plan is being effectively implemented and is achieving the desired outcomes
- Ensure relevant natural changes are sufficiently monitored to enable the plan to be adjusted if appropriate

# Monitoring and Review Framework

The monitoring and review framework requires

- A clear outline of what you are monitoring and why
- Indicators to measure changes or trends over time (e.g. Table 7.1 of PTC)
- Data collection requirements (who does the monitoring; how; frequency; archiving data; etc)
- Analysis, interpretation and reporting results
- Provision for review and adjustment of the adaptation plan as required

# Ready to Move on?

- You have effective measures (e.g. indicators) to monitor implementation and effectiveness of the plan
- You are regularly reporting progress on implementation and changes to your communities
- You are monitoring the critical natural changes relevant to the adaptation plan
- You are regularly reviewing and updating your adaptation plan

# Step 4: Implementation, Monitoring & Review

## Facts, tips and Resources

### Key Facts & Drivers

- **Indicators are critical** – must measure changes or trends over time that enable the effectiveness of the plan and implementation to be assessed
- Indicators must be **robust** and adequate for the long term, as well as being able to **evolve** over time with changing circumstances
- **Choose the most appropriate indicators** for your Council or community depending on what step of the pathway you're on and what your vision is for the future

# Step 4: Implementation, Monitoring & Review

## Facts, tips and Resources

### Tips

#### Successful Implementation (p63)

- Keeping the adaptation plan relevant to changing circumstances
- Maintaining senior management and political support
- Leadership
- Effective ongoing communication of the adaptation plan

# Step 4: Implementation, Monitoring & Review

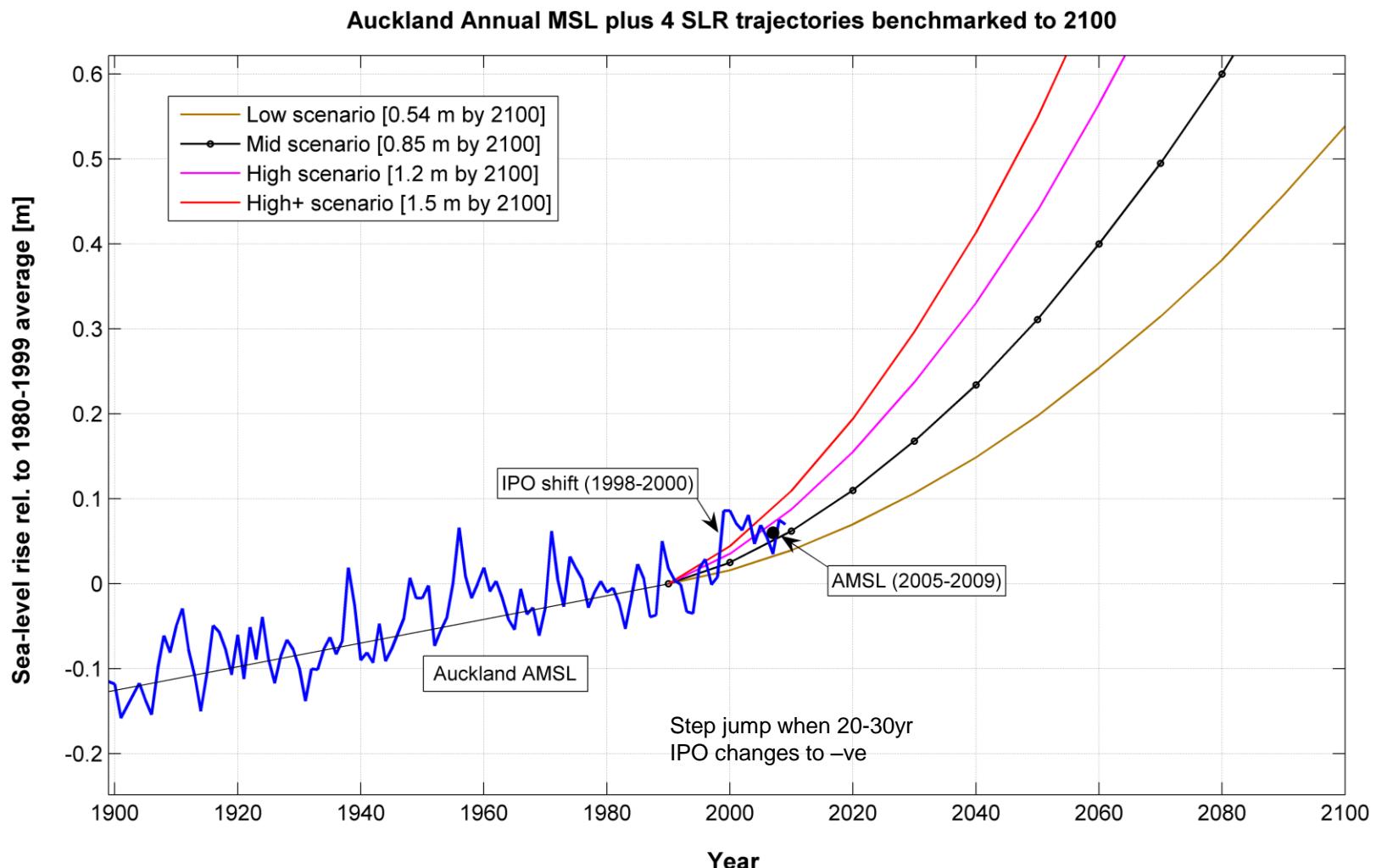
## Facts, tips and Resources

### Tips

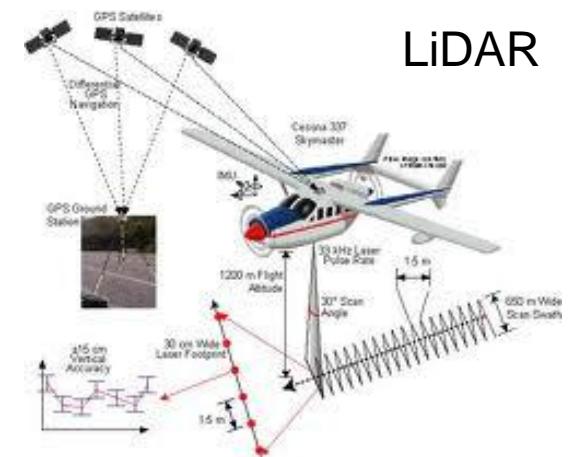
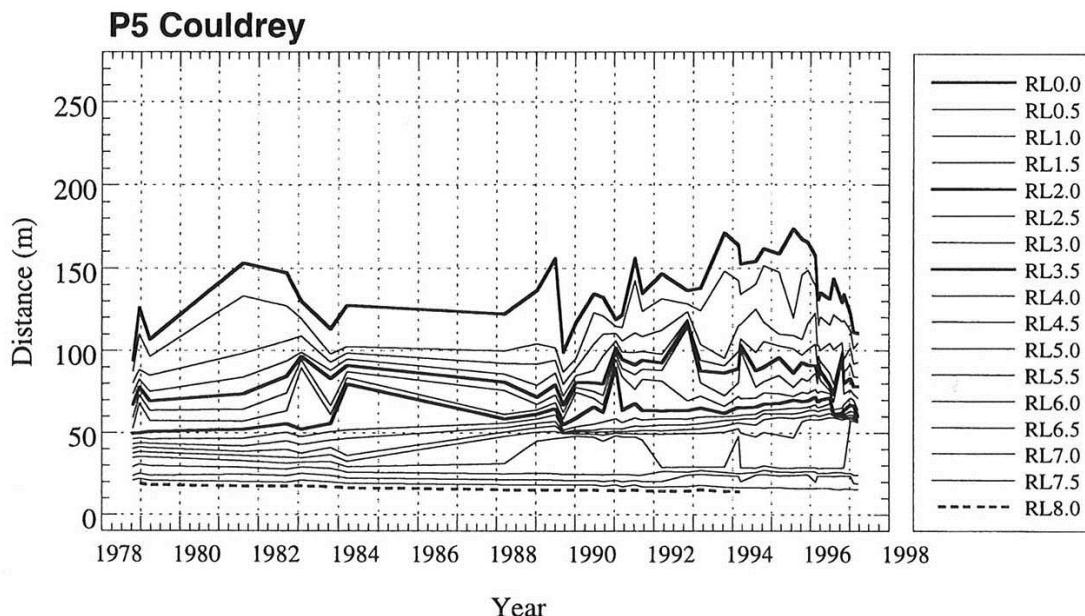
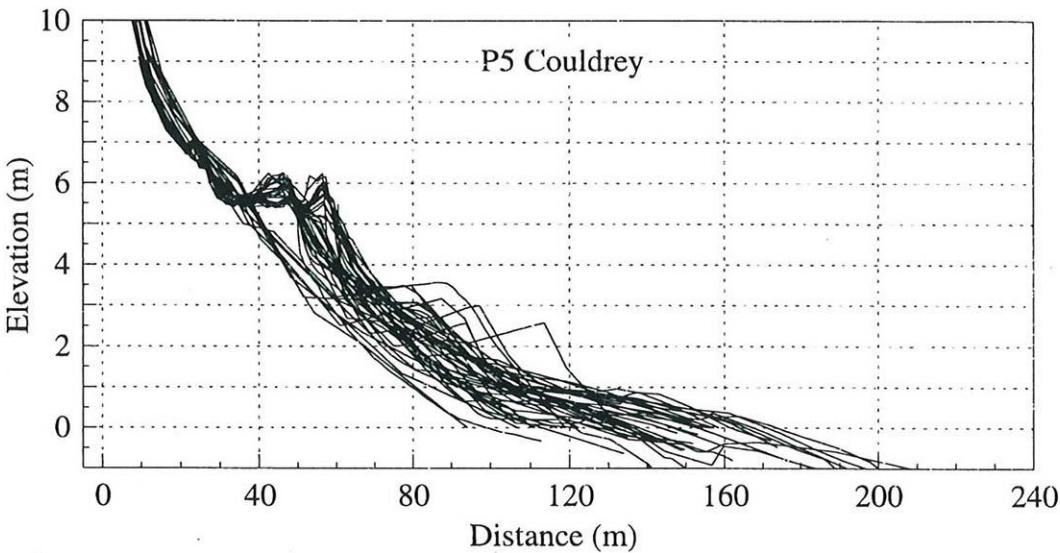
**Involving staff and stakeholders in implementation and monitoring**

- Enhances community learning
- Enhances the capacity to adapt
- Helps in mainstreaming adaptation

# SLR tracking - informs timing of adaptive decision-pathway approach



# Shoreline stability tracking- what value?



# **Step 4: Implementation, Monitoring & Review**

## **Facts, tips and Resources**

### **Tips**

**Examples of Potential Indicators are on**

- Pp. 64 – 66 PTC
- Choose those that can best complement information currently collected
- Reflect on what is/ may be collected locally, regionally, nationally

# **Step 4: Implementation, Monitoring & Review**

## **Facts, tips and Resources**

### **Useful Resources**

- Check out the resources listed on p105 of PTC
- Review how other councils have approached similar work (e.g., Box 7.2, p62 of PTC)
- Review the Auckland plot (in Box 7.3, p67 PTC)
- Key a watch on MfE & DOC work programmes

# Wrap up & take away messages

## Summary messages

- Adaptation is not so much an outcome as a journey towards more resilient communities
- You should consider where you are at on that journey and therefore the key steps you need to take now
- The decisions your Council or communities make today will affect future vulnerability and resilience for better or for worse
- It is not a new thing – it is about building on existing work you are already undertaking BUT within longer-term strategic framework (trying to avoid “short-termism”)

# Wrap up & take away messages

## Summary messages

- There is no instant answer – it takes time, effort and a strategic approach to mainstream adaptation within our communities – this is about human change
- Adaptation is a shared responsibility and partnerships are critical
- You will need to engage and move forward together with your communities – think carefully about the best processes for that
- Uncertainty is not an excuse for delay – an appropriate adaptation framework can manage uncertainty

# Wrap up & take away messages

## Summary messages

- Progress will be iterative as you respond to changing circumstances (e.g. political changes, community awareness, changing environmental pressures)

*“The challenge is not to find the best policy today for the next 100 years, but to select a prudent strategy and to adjust it over time in the light of new information.”*

*(IPCC, 1996)*

# Wrap up & take away messages

## Thanks and goodbye

- We all hope you have had a useful day
- We are interested in your feedback and suggestions on PTC and adaptation as you progress on your journey
- Thanks for attending and good luck on your adaptation journey
- It isn't all too hard – you have the skills & knowledge

*The longest journey begins with the first step*  
(ancient Chinese proverb)

# *Pathways to Change*

## Workshops 24<sup>th</sup> & 26<sup>th</sup> July

