Road Controlling Authorities Forum

Road Controlling Authorities Forum (New Zealand) Incorporated

with assistance from

New Zealand Water and Wastes Association

presents

Managing Stormwater and Road Run-off Tools, Techniques and Devices

nzwwa

New Zealand Water & Wastes Association

Waiora Aotearoa

Climate Change: What Might Happen?

Managing Stormwater and Road Run-off Seminar series

March 2008

Jacqui Yeates

Senior Advisor

Ministry for the Environment

Overview

- Introduction to climate change
- Climate change scenarios for NZ
- What can we do to adapt?
- Case study examples

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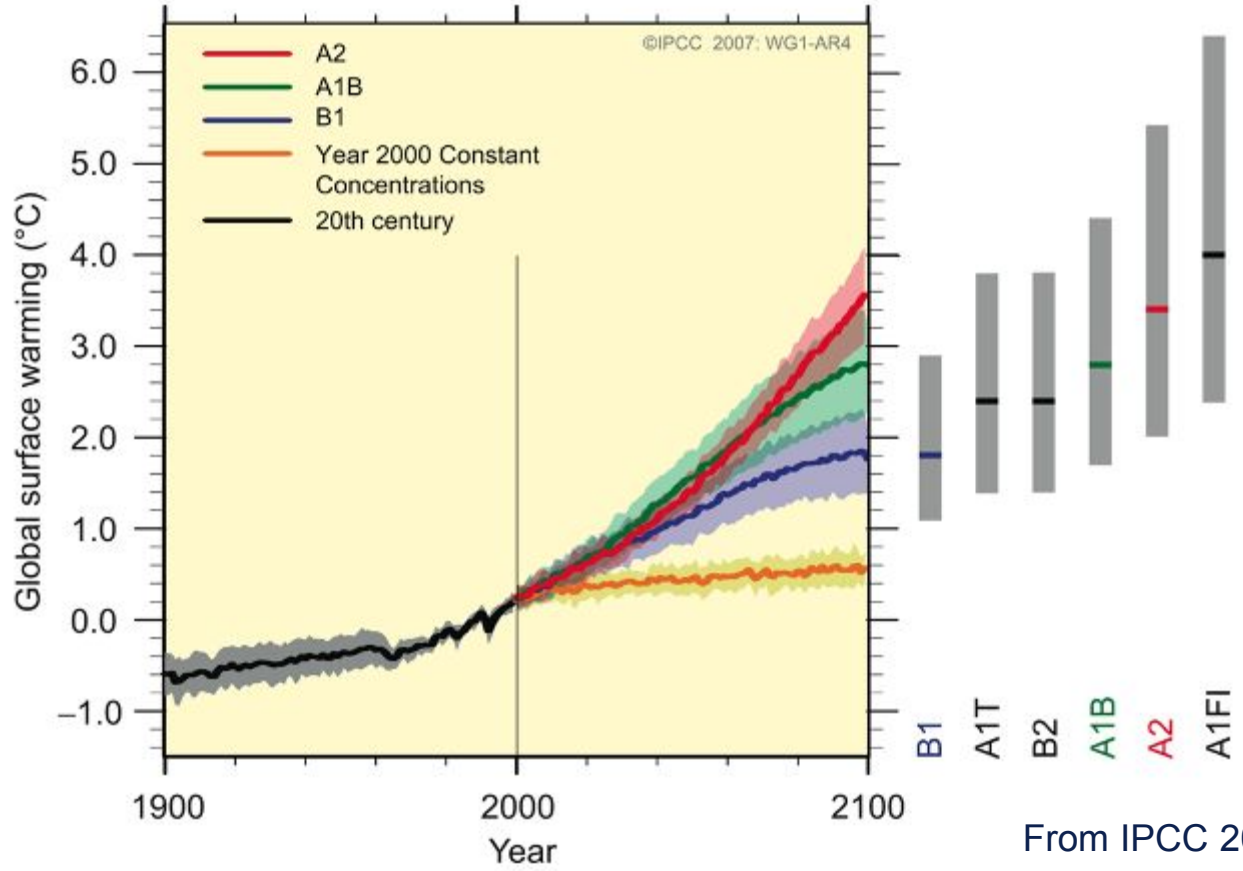
Most of the observed increase in global average temperatures since the mid-20th century is *very likely* (>90% probability) due to the observed increase in anthropogenic greenhouse gas concentrations



From IPCC 2007: WG1-AR4

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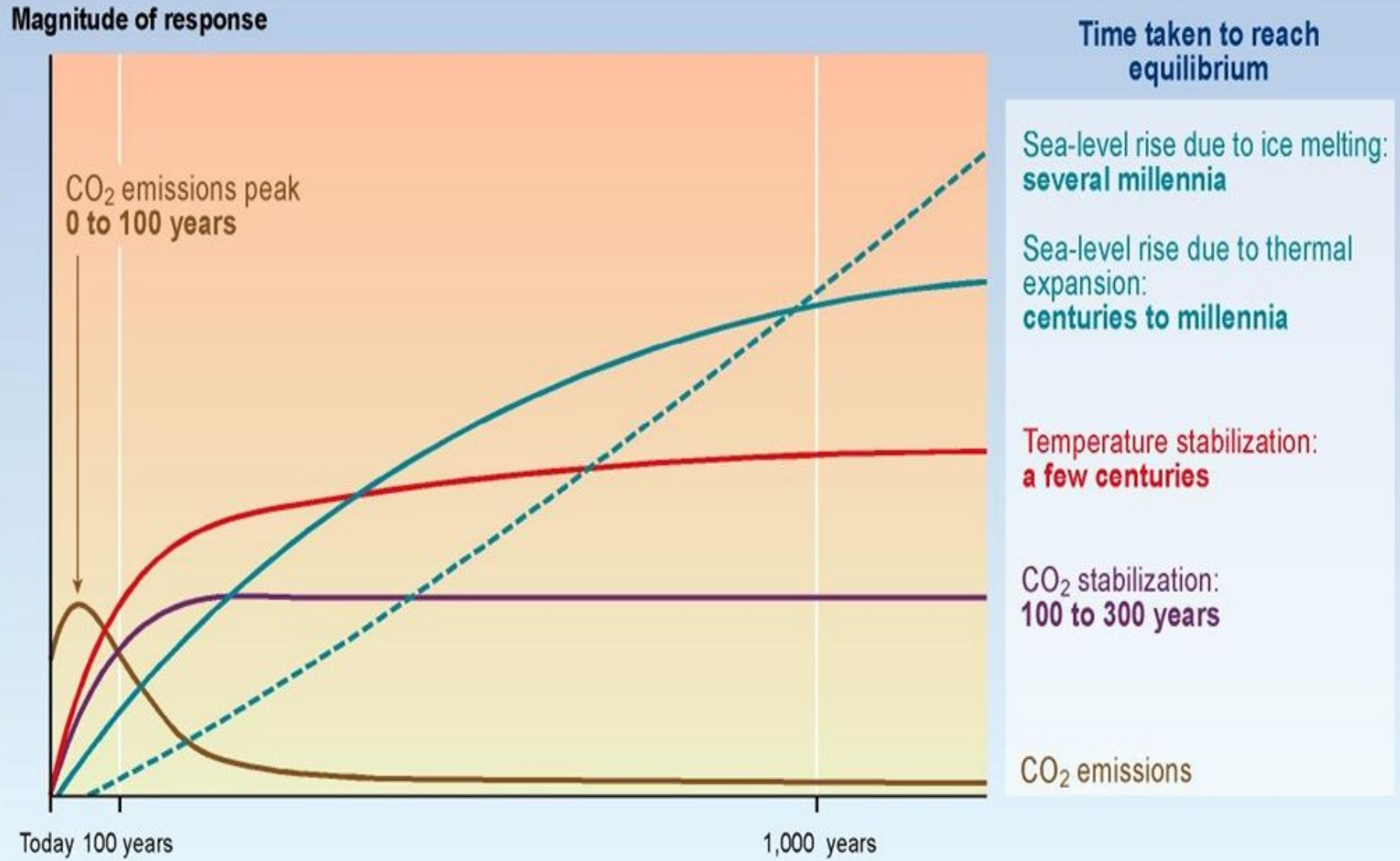
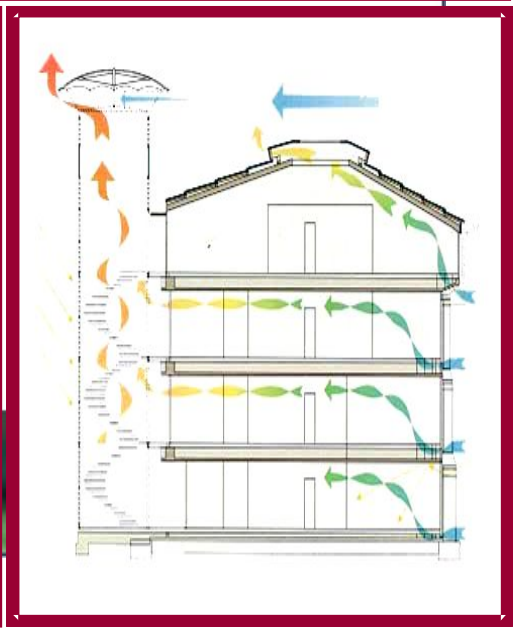
CO_2 concentration, temperature, and sea level continue to rise long after emissions are reduced



From IPCC 2001: TAR Synthesis report

Mitigation vs. Adaptation



How will NZ be affected?

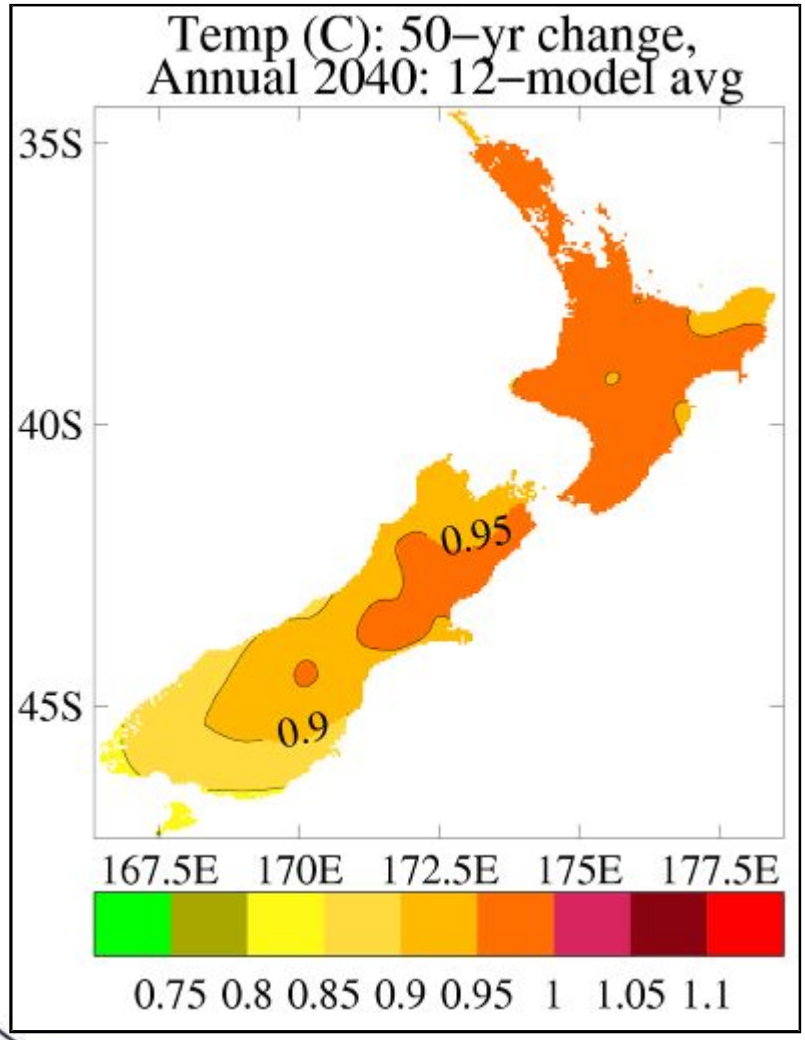
Regional Climate Impacts

Legend	
	Drier
	Wetter
	Wind
	Cyclones
	Coastal
	Snowlines & glaciers
	Natural areas
	Urban
	Commercial forests

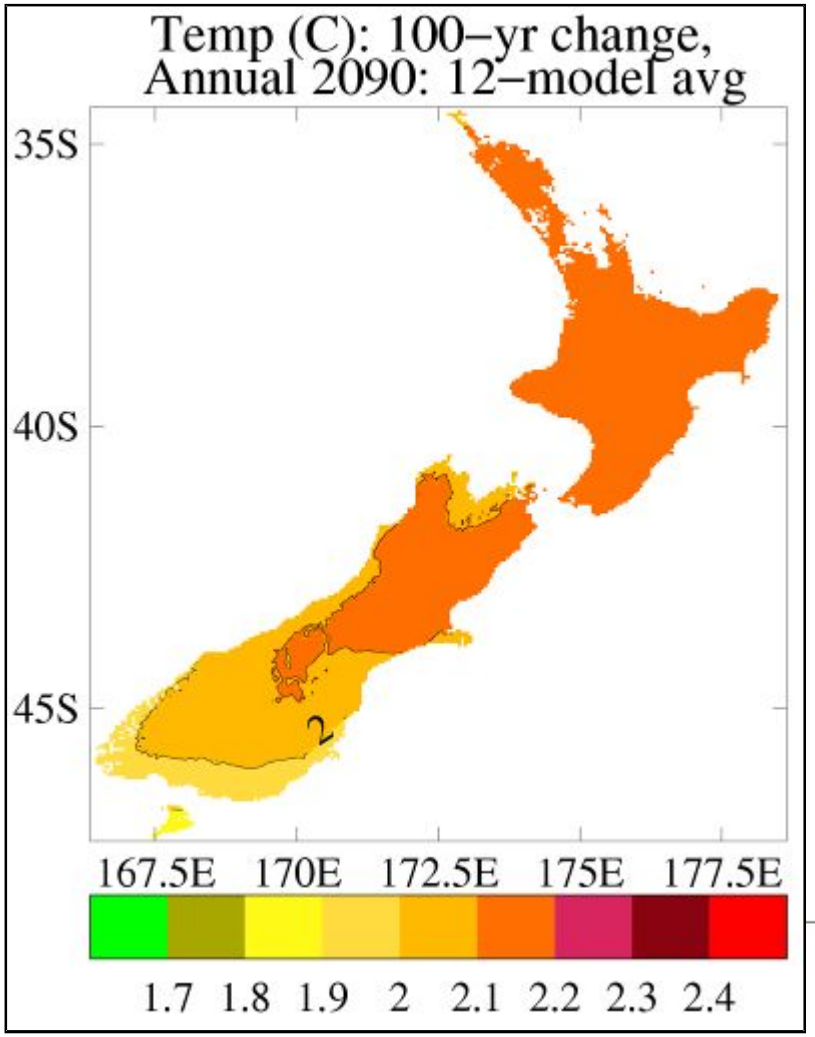
Available from: http://www.mfe.govt.nz/issues/climate/resources/impact-map/

Possible change in average annual temperature

50 years

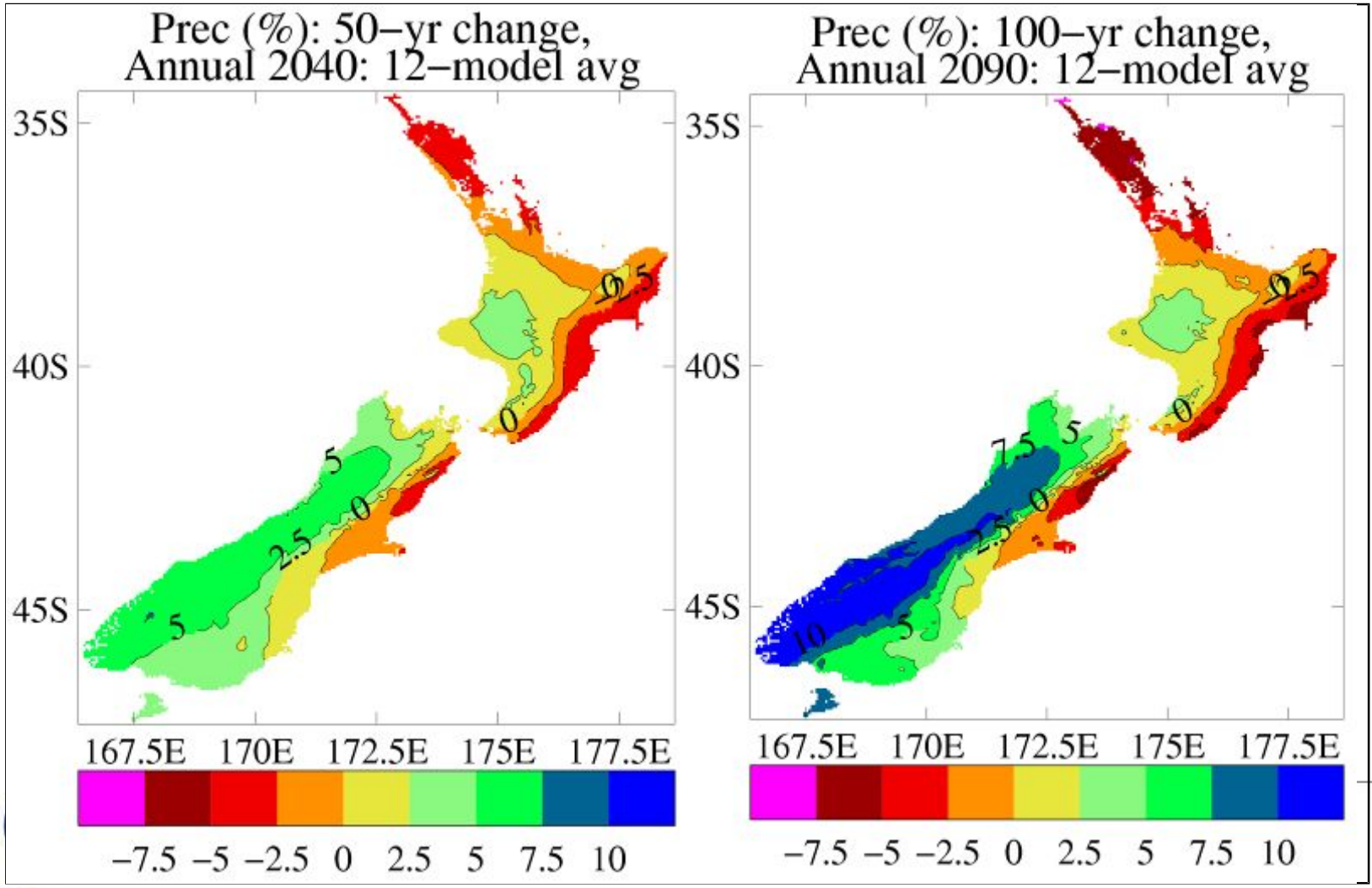


100 years



Possible change in average annual rainfall

50 years **100 years**



Sea level rise advice for planning for 2090s:

- A minimum sea-level rise of **0.5 m relative to the 1980–1999 average**
- Assessment of the sensitivity of **0.8 m relative to the 1980–1999 average**
- Beyond 2100 plan for **10 mm/year beyond 2100**
- Sea level also influenced by seasonal, El Niño-Southern Oscillation and IPO cycles
- NB: MfE sea level rise guidance is being updated

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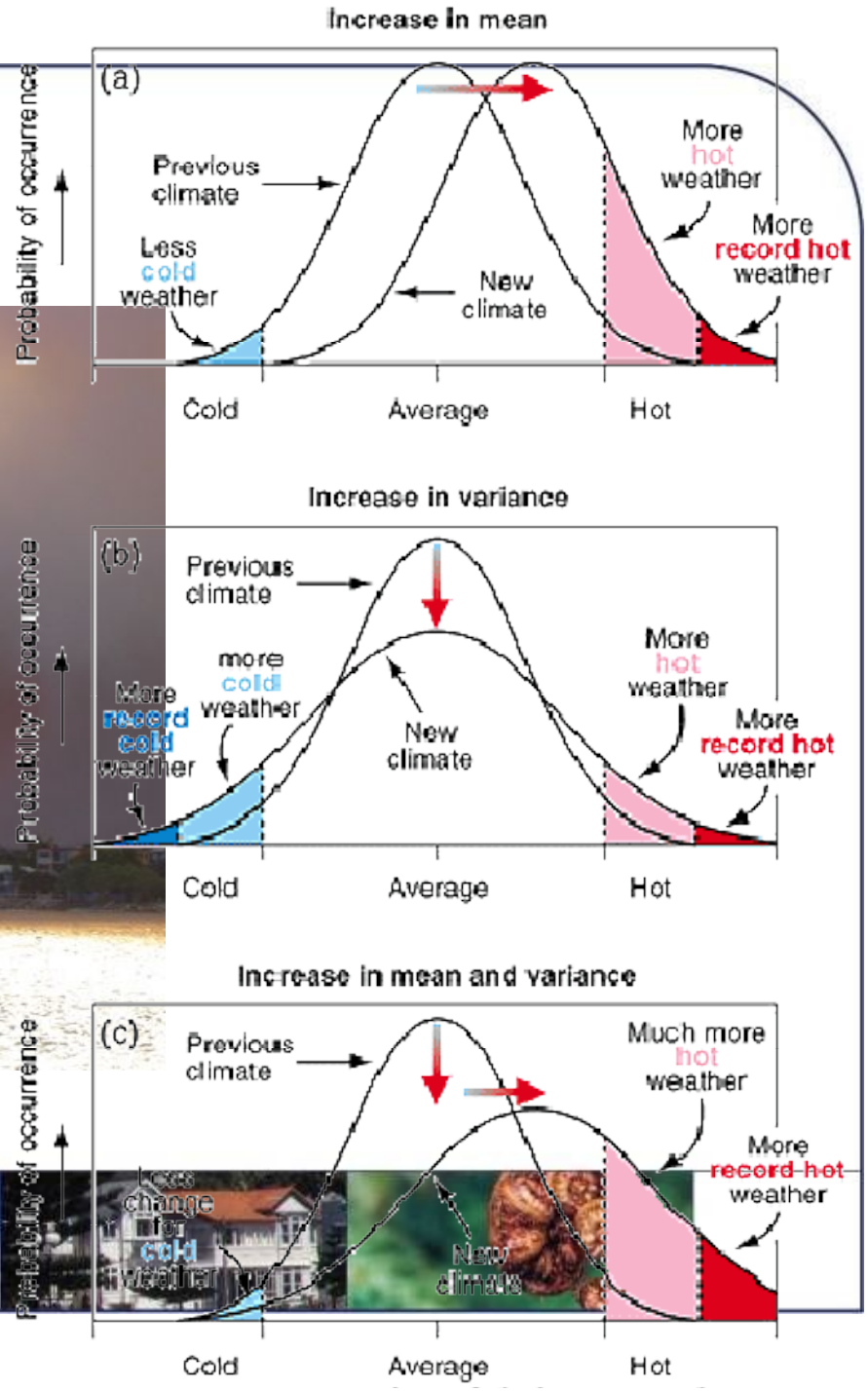
Extremes



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Summary of possible changes

- The climate of the 21st century is virtually certain to be warmer
- Floods, landslides, droughts and storm surges more frequent and intense (very likely, high confidence)
- Snow and frost less frequent (likely, high confidence)
- Eastern NZ less soil moisture (likely, medium confidence)
- Western NZ more rain (likely, medium confidence)

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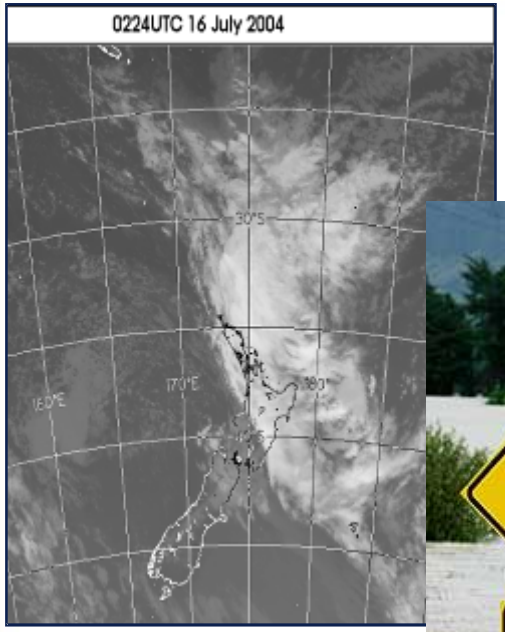
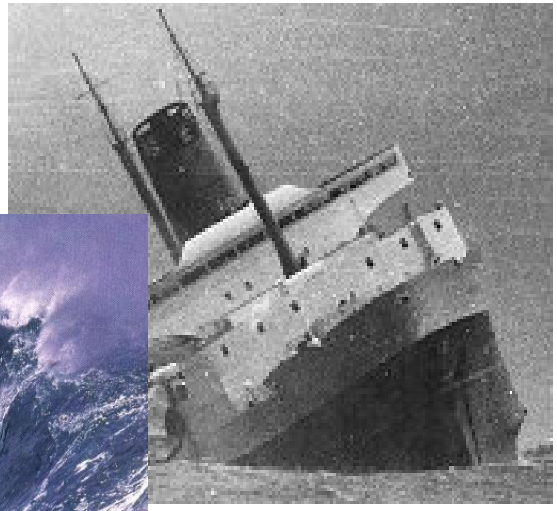
Impacts





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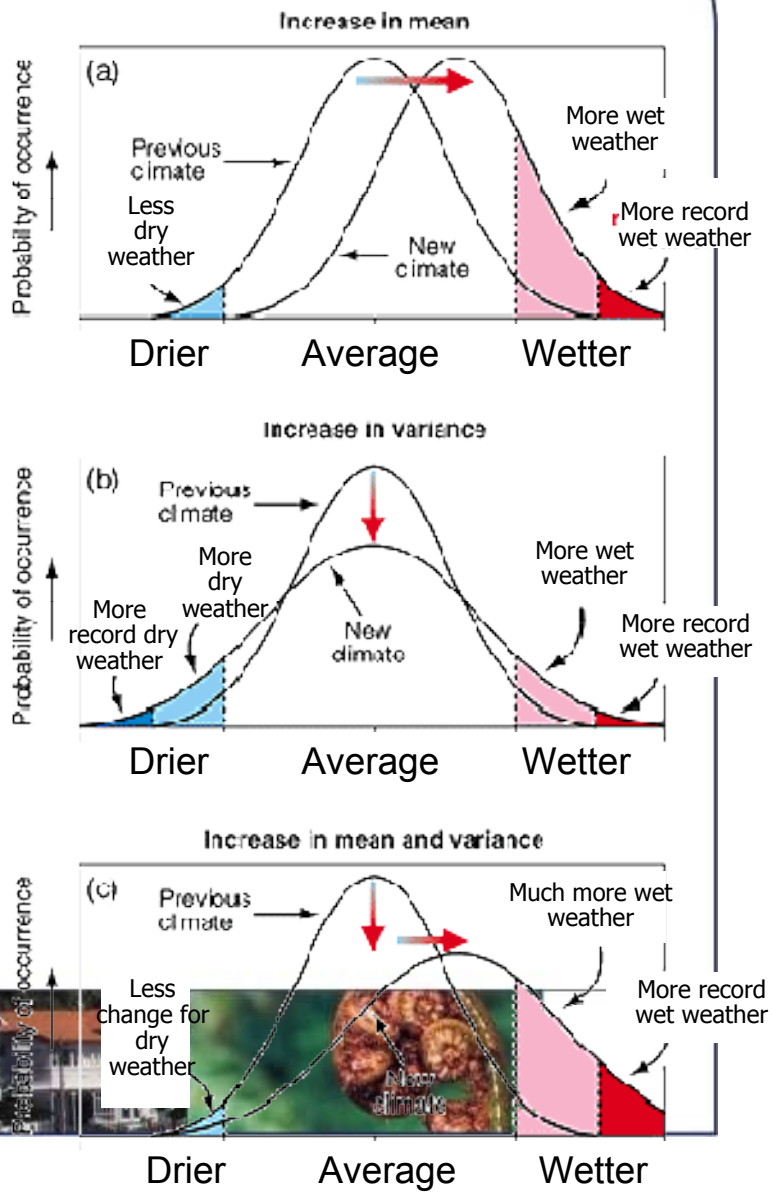
Risks to major infrastructure are likely to increase

- Issues for stormwater infrastructure:
  - More severe heavy rain events
  - Events occur more frequently
- By 2030, design criteria for extreme events are very likely to be exceeded more frequently



NB: Diagram represents simplified idealised situation

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Risks to major infrastructure are likely to increase

- Risks include
  - Larger total volume in flow events
  - Increased instances of debris blocking systems
  - Failure of floodplain protection and urban drainage/sewerage


What can we do to adapt?
Photo - John McColgan BLM Alaska Fire Service

Opportunities for stormwater adaptation

- Adaptation costs can be minimised if effects of climate change are considered when:
  - Infrastructure is being designed
  - Building permits are processed
  - Stormwater infrastructure is upgraded
  - District Plans are developed or come up for review
- Try to identify win-win, flexible, no-regret and low-regret options

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Statutory requirements

Resource Management Act:

- Section 7
  - "…all persons … shall have particular regard to … the effects of climate change…"
- Section 106
  - allows consent authority to refuse permission if certain natural hazards are present or could be made worse
- Section 3
  - Defines "effect"

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Other relevant legislation

Local Government Act (2002)

- Aims to ensure the sustainable development of communities, e.g. through long-term community planning
- Some regional and district plans include provisions for climate change effects

Civil Defence and Emergency Management Act (2002)

- Provides a forward-looking approach for preventing or limiting emergencies, including natural disasters that may result from climate change (e.g. storms, floods)

Soil Conservation and Rivers Control Act (1941)

- Objectives include the control of rivers, prevention of damage by floods, the control of erosion, and the promotion of soil conservation

Land Drainage Act (1908)

Government role is to support adaptation

- The Govt. initiated a work programme on adaptation
- Progress to date includes:
  - Technical Reports
  - Guidance Materials (Red Book)
  - Workshops
  - Engagement with stakeholders

- Build on and enhance the existing programme.
- We need to influence the adaptation practitioners
  - Engineers, planners, insurers, local govt etc
  - Updating the Quality Planning (QP) guidance (www.qp.org.nz/)
  - Project to identify climate change adaptation methods

See http://www.mfe.govt.nz/issues/climate/adaptation/index.html

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Case study example:
Tauranga City Council

Case Study: Tauranga City Council prepares for more intense rainfall

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Expected climate change impacts on the Bay of Plenty

- Decrease in overall precipitation
- Increase in the intensity of extreme rainfall events, and subsequent flooding

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Tauranga City Council response

- Determined changes in rainfall in the region
- Considering the expected climate change impacts in designing all new and upgraded stormwater infrastructure
- Some major stormwater upgrades have been completed, taking into account climate change risks.

Tauranga City Council response

http://www.mfe.govt.nz/issues/climate/adaptation/index.html

http://www.climatechange.govt.nz/

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Extra Cream ICE CREAM
CAUTION

CLIMATE CHANGE

How should local government be responding to climate change predictions?

John Palmer

March 2008

Two Key Issues for Stormwater Management

- Increasing global temperature are projected to result in:
  - An increase in extreme weather events and flooding
  - An increase in average sea level and storm surge magnitude

Key Predictions for NZ

- By 2080 average temperature could rise by up to 3-4 degrees C
  - For each 1 deg C increase in temperature the atmosphere can hold 8% more water
- By 2030 the return period for heavy rainfall events could halve, and by 2080 could reduce fourfold
  - A 20 year return period event now could be a 10 year event by 2030 and a 5 year return period event by 2080
- By 2100 the sea level could rise by more than 0.5 metres

Annual Mean Rainfall Predictions

- Wetter in the west, especially in the South Island, with a 20% increase on average
- Drier in the east with a 20% decrease on average

However:

The frequency of extreme rainfall events is still likely to increase in areas where mean rainfall is projected to decrease, i.e. less rainy days but more weather bomb type events

Stormwater and Roading Effects

- Increased frequency and/or volume of flooding
- Increased risk of blocked or overloaded culverts
- Increased reliance on effective secondary flowpaths
- Increased disruption due to landslides and washouts
- Increased peak flows and flood levels in waterways
- Increased risk of damage to infrastructure
- Increased maintenance costs

Sea Level Rise

- Possible Effects:
  - Stormwater systems which discharge to the coast or harbour could have reduced discharge capacity
  - Coastal roads and subdivisions could be subject to increased risk of erosion

Local Government Obligations

- The March 2004 Amendment to the RMA directs councils to “have particular regard to the effects of climate change” when making decisions under the RMA.

- In particular:
  - Engineers planning for roads, bridges and stormwater systems are expected to consider climate change risks
  - Asset managers advising the decision-makers must also consider climate change risks in making their recommendations

Climate Change Questions for Local Government

- Does your regional policy statement provide guidance to managing the effects?
- Do your regional water plans have any decision making criteria to take into account?
- Does your district plan identify it as an issue?
- In your LTCCP are possible changes in the level of service or future costs explained for specific assets such as stormwater and roading?

Checklist for Asset Managers

- Does your design of future stormwater and roading assets allow for the predicted effects of climate change?
- Does your Code of Practice require consideration of climate change?
- Do your AMP's identify expected changed levels of service needed in the future due to climate change?
- Are your CMP's up-to-date and include climate adjusted rainfall charts?
- Will your resource consent applications stand up to scrutiny in a hearing or Environment Court appeal?

Some cautions

- The effects will vary significantly around the country, even between inland and coastal areas in the same region
- Location specific weather and flood prediction is a job for specialists
- Catchment specific modelling and expert advice is required as generalised assumptions may result in over-predicting the effects of climate change
- Climate change needs to put into perspective as the impacts of population growth and increases in impervious surfaces are likely to be significantly greater

Summary

- Stormwater is about risk management and climate change predictions have just added an additional element of uncertainty
- Roads, bridges and culverts have a long life and therefore local government, and Transit, have legal and social obligations to take climate change into account
- Responding to predicted climate change impacts in current designs will better future proof asset performance and levels of service

References

- **Preparing for Climate Change**

  A guide for local government

  – NZ Climate Change Office of MfE

- **Incorporating Climate Change Predictions into Engineering Design**

  – Regular IPENZ one day seminars with presenters from NIWA, Opus and MfE

NZWWA

2008 STORMWATER CONFERENCE

15-16 May

Novotel Hotel, Rotorua

Three papers on climate change:

- Modelling Climate Change for New Plymouth District Council – Impacts Quantified
- Adaption to More Extreme Floods under Climate Change
- Developing a Climate Change Toolkit – Lessons Learned

Questions on climate change?


GARRICK TRENJAIN
TODAY'S MY LAST RUN MATE... YOUR ROAD'S SO BAD, FROM NOW ON I'M JUST GOING TO POST THE STUFF!
RURAL MAIL

Any last questions?

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Stock effluent issues?

NSEWG

- Code of practice for the minimisation of effluent from trucks onto roads
- Education campaign to farmers to stand stock
- Network of disposal sites
- Meatworks and saleyards accepting effluent
- Consent issues

Stock Crossings Group

- Guidelines for stock crossings
- Sample bylaw

Check the Parking Lot

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Summary of the day

- Review/update of seminars 2007
- Issues in managing stormwater/road runoff
- Current practices and case studies
- Innovative technologies
- Comparing techniques, tools and devices
- Using TP10 outside Auckland
- Climate change

Did we meet our objectives?

- To continue education on managing stormwater and road run-off
- To put stormwater management in context
- To explain techniques, tools and devices available in New Zealand
- To understand what works in what situations, where and how

What next?

For delegates

- Feedback forms
- Share what you have learned with colleagues
- Implement what you have learned today

For Stormwater Group

- Analyse evaluations and suggestions
- Update the website
- Continue implementing action list

Feedback forms

- Content of programme today
- Venue and facilities
- Gaps in best practice
- Frequently asked questions
- Case studies for the website
- Future activities for the Stormwater Group

Website details

http://www.rcaforum.org.nz/stormwater-group/

Or

navigate home page/working groups/stormwater group

- Membership
- Current topics
- Meetings
- Resource material
- Land Transport NZ research
- Published papers
- Case studies and FAQ – currently empty

Thanks

- to those who developed the presentations
- to the suppliers of photographs
- to the presenters
- for your attendance
- for completing the feedback form

Have a safe journey home

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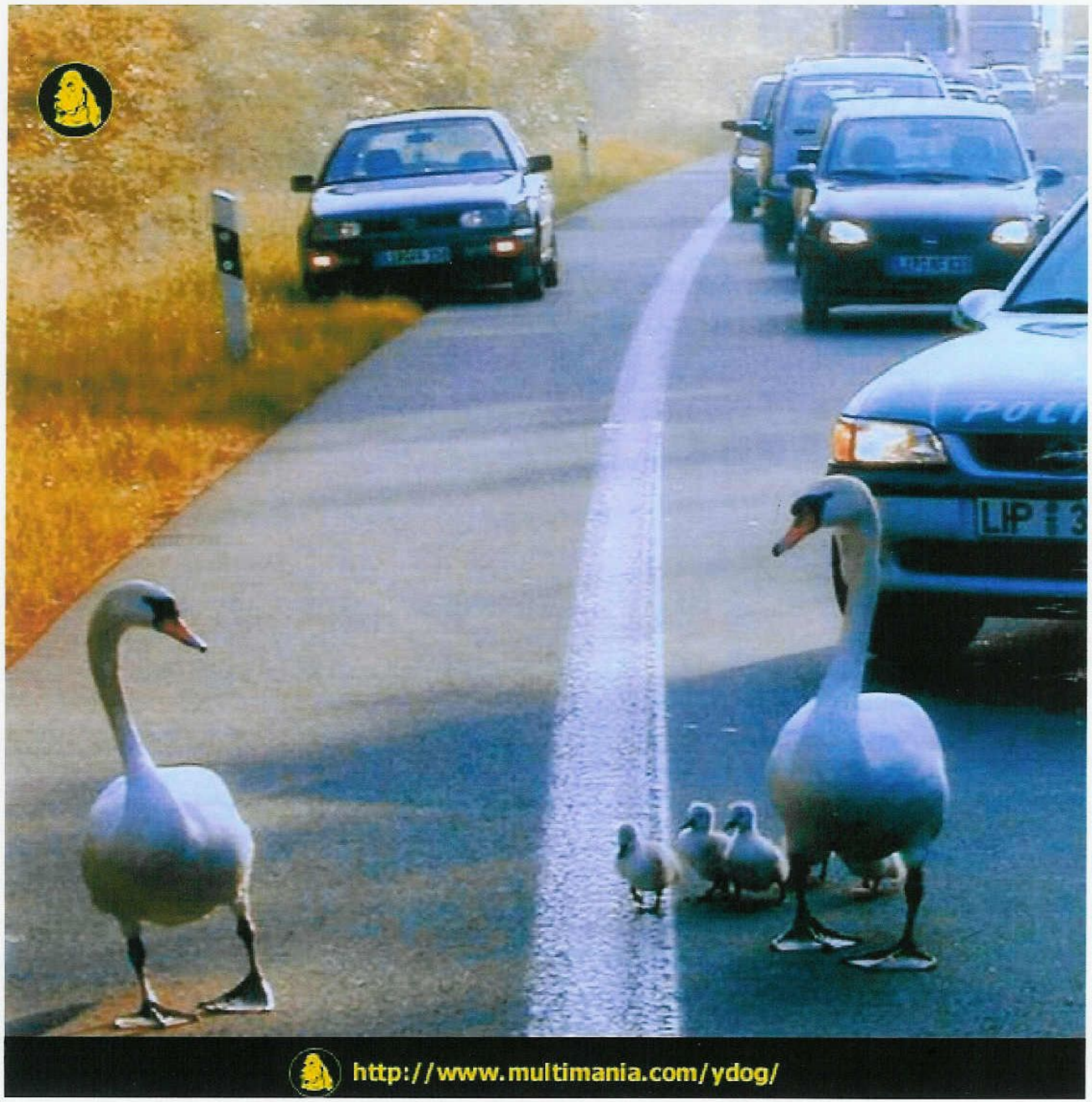
http://www.multimania.com/ydog/