Climate change in the Bay of Plenty

Water Technical Advisory Group Meeting

8 May 2018

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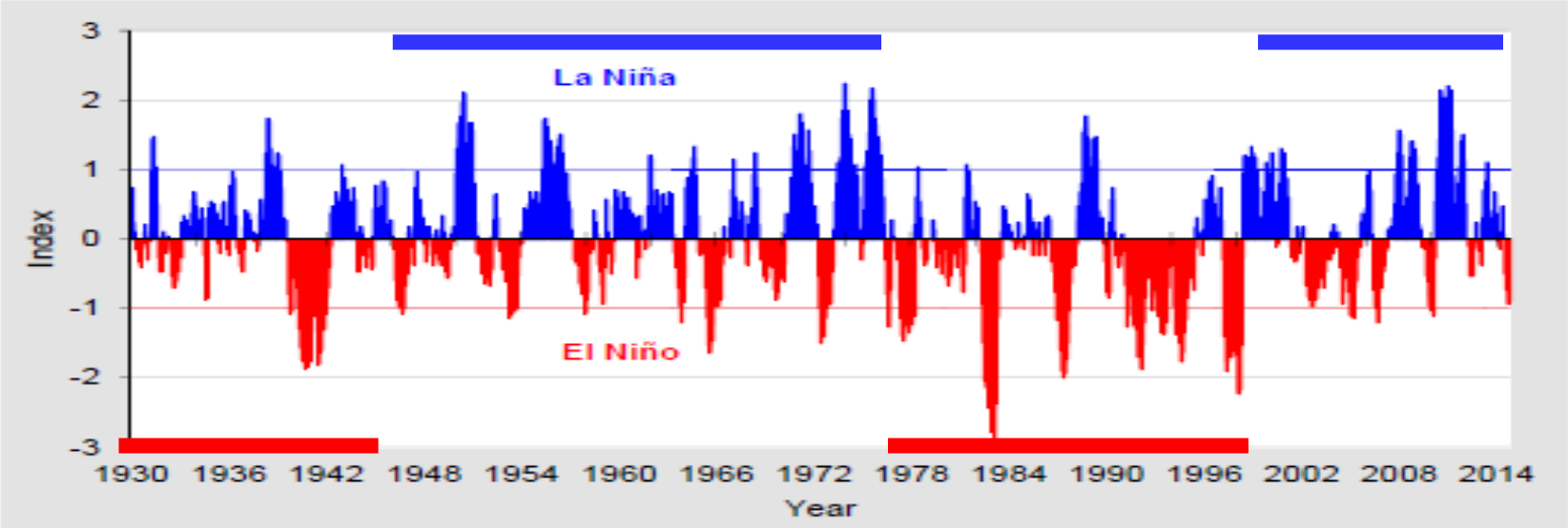
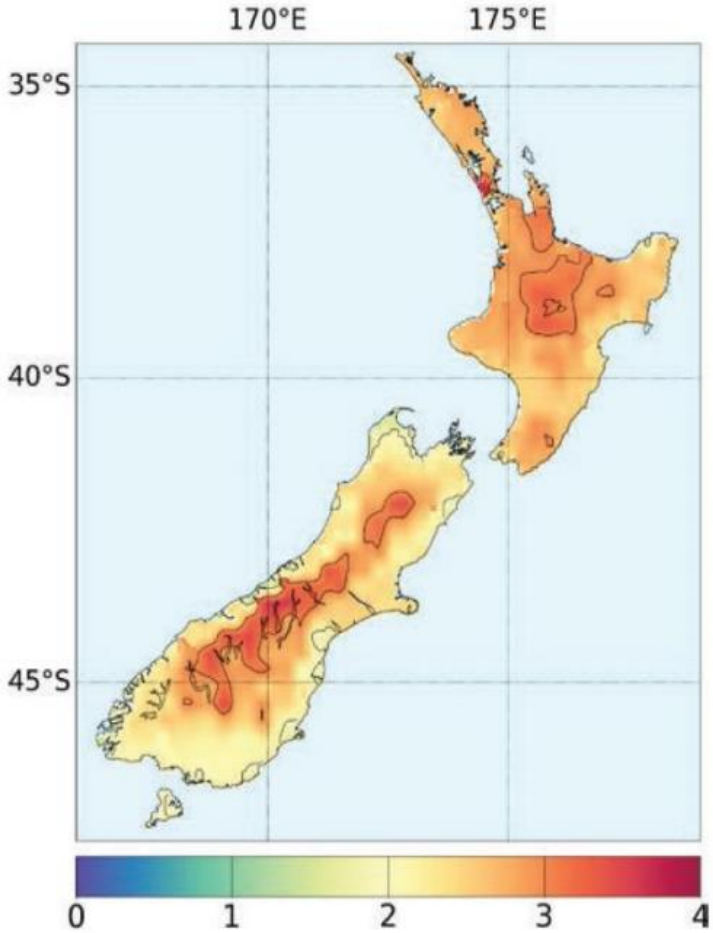
Climate pattern

Southern Oscillation Index from 1930-2014





Average change in temperature (°C) by 2090 under RCP8.5

BoP climate projection

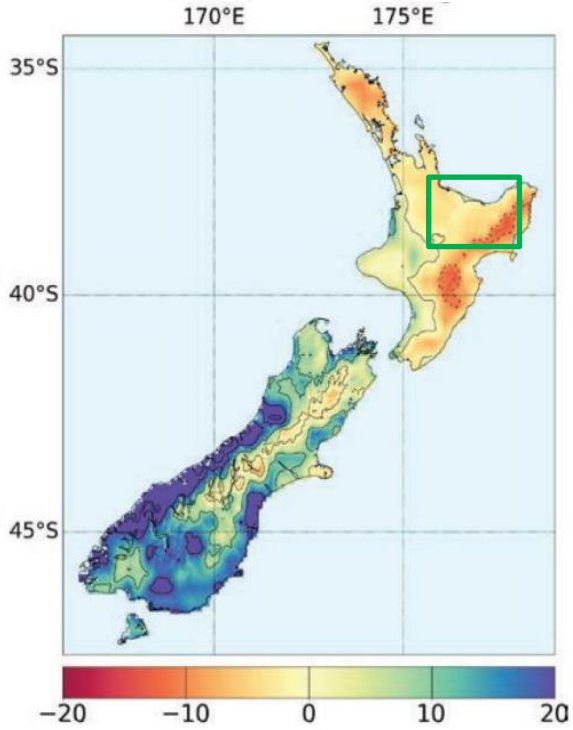
- Annual rainfall roughly the same
- Frequency of rainy days roughly the same

- Rainfall intensity likely to increase
- Warmer Temperature
- More hot days warmer than 25^{o}C

- Fewer frosts
- Summer easterlies, Winter westerlies
- Sea level – planning for 0.9m by 2112

Annual average rainfall changes by 2090

Under a low emissions scenario (left) and a high emissions scenario (right) compared to the 1995 baseline



Red = dryer

Yellow = about the same

Blue = wetter

www.mfe.govt.nz,2017

Glass half full

- Warmer, therefore:
  - **longer growing season**
  - **fewer frost allows new crops**
  - **holiday destination**

- Projected annual rainfall is similar
- Number of rainy days roughly the same*
- Renewable electricity: hydro and geothermal

Glass half empty

- Storm events more intense
- Flooding & erosion risks
- Agriculture emission an unique challenge

- Indigenous eco-system under pressure
- Warmer – Lake more algal blooms
- Vulnerable estuaries

- Biosecurity – invasive pests and weeds
- Range of trout reduced
- Sea-level rise and coastal settlement

CLIMATE EFFECTS

INTERNATIONAL

NATIONAL

REGIONAL

APPLICATION

Climate Change (Past)

Climate Change (Future)

Climate Cycles (Past and Future)

NIWA High Intensity Rainfall Design System (upgrade) 2018

UoW, NIWA Storm-tide propagation in Tauranga Harbour 2018-

Bay of Plenty Community Carbon Footprint 2015/16 2017

LGNZ Local Govt Leaders' Climate Change Declaration 2017

Westpac Climate change Impact Report 2018

CCII Climate change in Lowlands Kaituna 2017

SCION Climate Change in Rangitaiki 2018-

IPCC 2007 (AR4), 2014 (AR5) CLIMATE CHANGE

MfE 2008
Climate change effects and impact assessment: a guidance manual for local government in New Zealand
Temp, RF

MfE 2008a
Coastal hazards and climate change: a guidance manual for local government in New Zealand
SLR

MfE 2010
Tools for estimating the effects of climate change on flood flow: a guidance manual for local government in New Zealand
Flood risk

NIWA 2011
Coastal adaptation to climate change - Pathways to change
SLR

MfE 2008b
Preparing for climate change
Temp, RF

MfE 2009
Preparing for coastal change
SLR

MfE 2010a
Preparing for future flooding
Flood risk

NIWA 2013
The climate and weather of the Bay of Plenty (1981-2010)
Wind, RF, Temp, sunshine, storms, swell

NIWA 2003
The climate of the Bay of Plenty: past and future
RF, Temp, wind

NIWA 2006
Impacts on Climate Change of coastal margins of the Bay of Plenty
SLR

ECL 2006
Biotic Effects of Climate Change in the Bay of Plenty
Biosecurity, biodiversity, economic land use

NIWA 2011
An updated climate change assessment for the Bay of Plenty
Temp, RF, wind, drought, pasture growth

NIWA 2014
Assessment of effects of large scale climate oscilations on the flood risk in the Bay of Plenty
IPO, ENSO, SAM, IOD

SOLGM
Climate change & Local Government
LGA
CDEMA
BA

BOPRC Policies and Guidelines:
- Position Statement on Climate Change (LTP)
- Regional Policy Statement National Hazards
- Coastal Policy Statement (CPS)
- Coastal Environment Plan
- Infrastructure Strategy
- Asset Management Plan (AMP)
- Stormwater Guidelines
- Hydrologic and Hydraulic Guidelines

BOPRC Projects:
- River Scheme Sustainability
- Water Programme
- Spatial Plan

[Climate Effects Consolidated Report for River Scheme Sustainability Project 2015]

KEY:

SLR	= Sea Level Rise
RF	= Rainfall
IPO	= Interdecadal Pacific Oscillation
ENSO	= El Nino Southern Oscillation
SAM	= Southern Annular Mode
IOD	= Indian Ocean Dipole
SOLGM	= Society of Local Government Managers
LGA	= Local Government Act

Climate change effects

some examples related to water resource…

- Cyclone intensity
- Extreme events
- Flood vulnerability
- Evapotranspiration
- Hydrologic balance
- Water cycle process
- Soil salinization
- Water resource availability
- Drought severity
- Food security
- Variability
- Water logging
- Water fluxes
- Sea level

Adaptive measures around the world…

- Integrated water resource management policies
- Hydro-Economic analysis
- Adaptive water governance
- “Climate proofing” water resources development policy
- Local water governance
- Rural groundwater market
- Industrial water management
- Drip irrigation
- Stormwater reuse

Questions

What are the reasonably foreseeable impacts of climate change?

How do we improve our knowledge about the health of our rivers and lakes under climate change?

What information can help us build our resilience in the changing climate?

Thank you!

What is the change?

NZ climate projections http://ofcnz.niwa.co.nz

Future temperature extremes web tool http://futureextremes.ccii.org.nz/

Bay of Plenty http://www.boprc.govt.nz/residents-and-communities/climate-change/