Climate Change and Natural Hazards: Using impact assessment to prepare New Zealand for Climate Change

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The challenge of climate change…

- The challenge of climate change…
  - long-term problem (intergenerational)
  - multi-disciplinary (cross-sectoral)
  - global issue requiring collaborative effort
  - impacts of climate change not certain
  - embedded in other development goals

…requires a dual response

- Mitigation

  what we do to the climate"

  (= reducing greenhouse gas emissions)

  driver: international regime + co-benefits

- Adaptation

  "what the climate does to us"

  (= dealing with impacts of climate change)

  driver: local effects + co-benefits

NZ Climate Change Office

- Cross-government programme located within Ministry for the Environment (MfE)
- Works across government, with communities and the private sector, and on internat'l issues
- Key objective: ***"by 2012 set NZ's emissions towards a permanent downward path"***

Climate change effects

- Even if emissions are reduced substantially at the global level, some climate change is inevitable
- Preparing for the effects of climate change is a necessary strategy in addition to mitigation

Adaptation – goal and barriers

"NZ manages the risks, opportunities and impacts arising from the effects of climate change and ensures adaptation as smoothly as possible"

(MfE Statement of Intent 2004 - 2007)

Barriers to smooth/efficient adaptation:

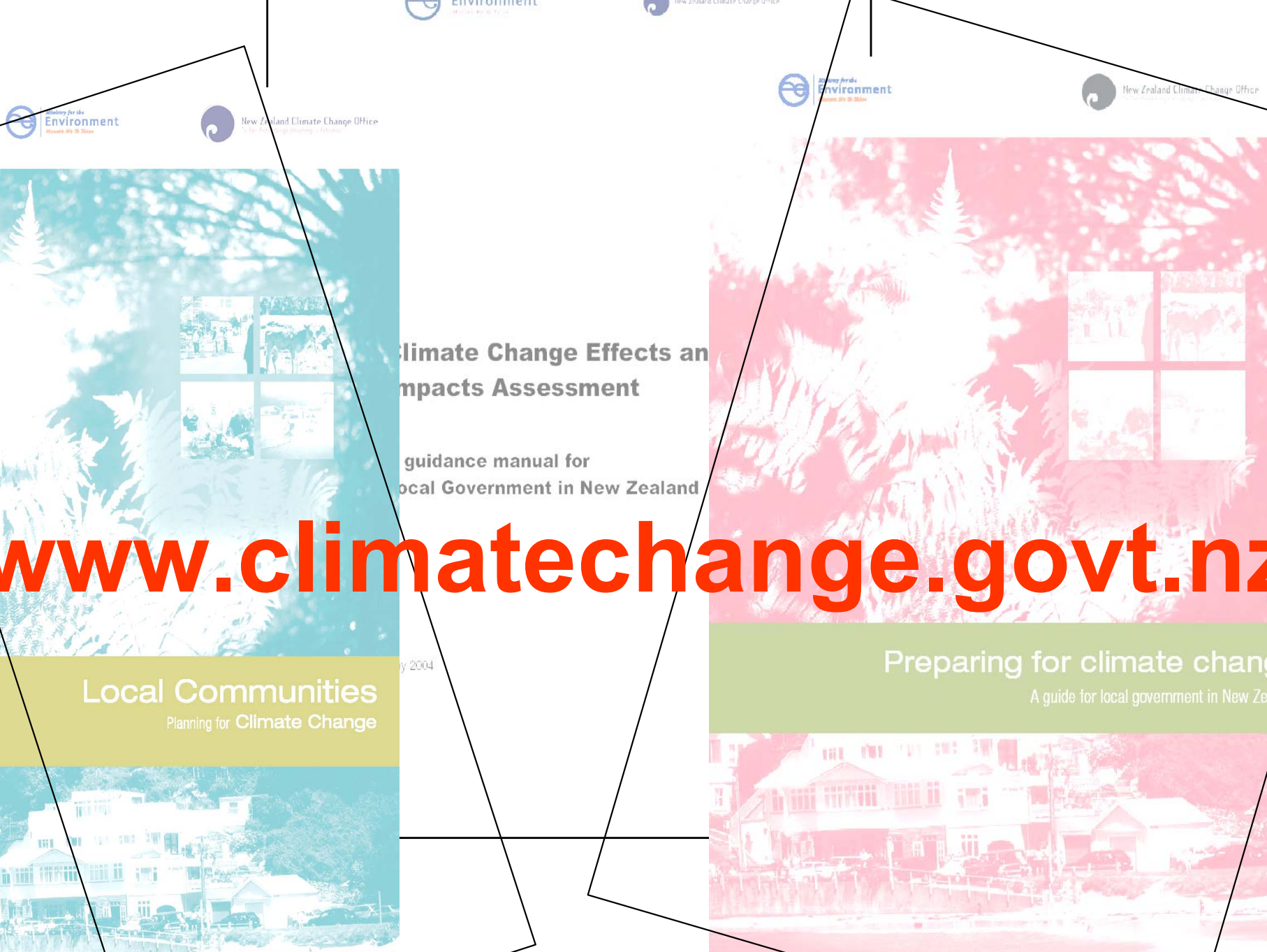
- Uncertainty / complexity of information
- Resources / 'additional' work
- Priorities / planning time frames

Adaptation – co-benefits

- enhances resilience against current weather extremes and climate variability
- fosters forward planning and raises awareness of changing risks and resources
- increases link between science and local environmental decision-making

Adaptation – policy approach

- Amendment of RMA section 7:
  "consider effects of climate change"
- Role of other legislation
  (LG, MCDEM, Building)
- Guidance materials including
  Quality Planning Guidance Note
- Case studies and best practice examples
- Underpinning information, dissemination


Ministry for the Environment
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www.climatechange.govt.nz
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New Zealand Climate Change Office
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Adaptation – local drivers

Region-specific mid-range scenarios:

- temperature rise (2-3ºC by 2080s – 0.7ºC to date)
- rising sea-levels (30-50cm by 2100 – 10-20cm to date)
- change in rainfall patterns (drier in east/wetter in west)
- change in weather extremes (floods, droughts, frosts)
- small change in averages can lead to large change in extremes and associated hazards/costs
- impact (+/-), significance and best response depends on sector, local context and priorities

Adaptation – local drivers

Risk assessment/management approach:

- Integrate climate change considerations into normal risk assessment practice
- Qualitative assessment – "could it matter?"
- Screening assessment – "ballpark figure?"
- Detailed assessment – "your best estimate?"
- Increasing complexity, realism, resource needs

Adaptation - example

Estimate change in stormwater flood risk under climate change for a given catchment?

- start with existing flood risk and expected future performance; check data robustness, climate variability
- qualitative: heavy rainfall could increase even where average rainfall is expected to decrease, therefore climate change could matter for stormwater

➢ do screening analysis

Adaptation - example

Screening analysis – heavy rainfall

- Guidance material provides temperature and generic scaling factors for heavy rainfall

Adaptation – example

e.g. for 1-in-50 year 12 hour peak rainfall

ARI (years) duration	2	5	10	20	30	50	60	70	80	90	100
< 10 minutes	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
10 minutes	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
30 minutes	7.4	7.5	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7
1 hour	7.1	7.2	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5
2 hours	6.7	7.0	7.1	7.2	7.3	7.3	7.3	7.3	7.4	7.4	7.4
3 hours	6.5	6.8	7.0	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2
6 hours	6.3	6.6	6.8	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1
12 hours	5.8	6.2	6.5	6.6	6.7	6.8	6.8	6.8	6.9	6.9	6.9
24 hours	5.4	5.9	6.2	6.4	6.5	6.6	6.6	6.6	6.7	6.7	6.7
48 hours	4.6	4.9	5.1	5.2	5.3	5.4	5.4	5.4	5.4	5.5	5.5
72 hours	4.3	4.6	4.8	5.0	5.1	5.2	5.2	5.2	5.3	5.3	5.3

Adaptation - example

Screening analysis – heavy rainfall

- Guidance material provides temperature and generic scaling factors for heavy rainfall
  - Use a range of temperature scenarios for target year, e.g. 1 – 2.5 ºC for 2080s, screening table gives estimated rainfall increase 7 – 17%
  - Feed results into stormwater model – significant for catchment and system?

Adaptation - example

Detailed assessment – heavy rainfall

- Use location-specific information (climate and non-climate) and more complex models for most realistic assessment
  - Use stochastic time series modelling, other catchment-specific (mesoscale) weather or rainfall model, plus temperature increase
  - Incorporate effects of land-use change, community development

Adaptation - example

Risk management – what to do?

- Look at uncertainties and assumptions
- Consider risk of lock-in vs later upgrades
- Community expectations/consultation
- … make decision on stormwater design

Adaptation - conclusions

- Don’t re-invent the wheel – use existing process
- Step-by-step approach makes initial assessment accessible without major resource investment
- Assess climate change effects at design stage or when infrastructure due for upgrade anyway
- Responses are not determined by risk assessment. Responses need to fit with wider regulatory context and community goals