Certain to deeply uncertain: a decision-making teaser

Judy Lawrence  Rob Bell  Paula Blackett  Scott Stephens

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Some strategies are workable now - but may not be in the future

“Best estimates”, “most likely” – misguided

Implies we can predict the future
Based on historic and short trends
Uncertainty problem

• People can’t imagine 2117 and beyond

• Difficult for people to accept incurring costs for a future they can’t even imagine

• But not all change is uncertain
• Near-term certainty with narrow range of SLR e.g. up to 2040s
• From mid-century on: increasing uncertainty incl. polar ice sheet instabilities
⇒ Need to test response options or actions with a range of scenarios
The Change problem

• Climate change is dynamic

• Policy design is often static in space and time

• Monitoring effectiveness of policy is difficult politically

• People prefer small and incremental change that doesn’t threaten way of life, values and sense of place
Policy problems are different

Types of climate change impacts

- *Slowly emerging impacts*—sea level and groundwater rise
- *Widening climate variability*—drought, flood frequency
- *Extremes*—coastal storm surge, intense rainfall, wind
- *Combos*
- *Cascades* to social and economic domains/ governance and legal
Capacity to act

- Similar to existing variability—capacity to adapt

- Variability and impacts greater than current climate range experienced—challenges institutions and organisations capacity to adapt

- Outside current and lived experience with regime shifts—challenges politics, institutions and ability to adapt fundamentally
Decision-making challenge

Managing **uncertainty and change**
- Over long timeframes
- With many organisations and actors
- Over interdependent scales of governance
- Requires mediation of different values and preferences
- Current and future generations

Decision processes and practices that **fit the problem space**
Requirements for decision makers

• Guidance that helps navigate a changing and uncertain future

• Guidance that helps mediate difficult conversations with stakeholders and between different experts

• Tools to give certainty yet flexibility

• Simple to understand and use

• Robust under a range of future conditions
Key elements of revised national coastal guidance

- Treatment of uncertainty and changing risk profiles
- Actions linked to types of uncertainty and decisions
- Values-based - different types and levels of community engagement
- Embeds dynamic adaptive pathways planning
- Supported by a monitoring/triggering for flexibility
Decision cycle: NZ coastal hazards guidance

Adapted from UN-Habitat 2014
Adaptation—essential ingredients

- Legitimate engagement process that is transparent & collaborative
- Clear communication of uncertainties and how to address them
- Ability to switch pathways when objectives start to fail
- Mainstreamed across all council functions and processes
- Monitoring and review
- Committed governance over long timeframes
Decision types linked to uncertainty types: coastal hazard assessments

Stephens et al., 2017
Hazard assessment linked to decision type

Situation: town exposed to hazard
- model 1% AEP + upper 95% C.I.
- model SLR increments
  Decision: adapt to hazard

Situation: Proposed greenfield-land development
- model 1% AEP
- model fewer, larger SLR scenarios (≥ 100-years)
  Decision: avoid hazard

Situation: low-value amenity
  Decision: accept hazard

+0.1–0.2 m
SLR increments

Present-day 1% AEP
coastal hazard

Present-day MSL
Building response options to shelf life

Effectiveness of flood protection measures against sea-level rise

Tipping point (objective fails): if ≥1% of total city area is flooded (end of bars)
Dynamic adaptive pathways planning

After Haasnoot et al. (2013), Hermans et al. (2017)
Pathways development and evaluation

Asks the following questions:

• Will the option meet the long term objective?
• If not, under what conditions will it fail requiring a switch to other options?
• Will it increase or decrease exposure to the changing hazard?
• What combination of options will give the greatest flexibility?
• What are their side effects? What is the residual risk?
• What other actions are required to meet the objectives? (e.g. planning controls, regulations, warning systems, information, funding, insurance/bank investment issues)
Lead time (signals, triggers and thresholds)

After Marjolijn Haasnoot: Deltares 2016
Managed retreat in the conversation

Considering uncertainties widens the decision space

• Pre-emptive or reactive?
• Scale of transition?
• Who initiates – who decides and how?
• Voluntary or compulsory?
• Funding, compensation and insurance issues
What it took to get to GO

2010 Kwadijk paper
2012 Uncertainty framing presentations
2011 Change agent
2013 Deltares contact
Papers Lawrence Haasnoot
2013-15 Media coverage
2014 SDG Game training
2014 Action research
2014 Pathways map emerged
2015 Hutt river options

2004 Legislation
2007 IPCC AR4
Canterbury earthquakes
2013 Chief Science advisor Report
2014 Legislation
2014 IPCC AR5
2014 Insurance Council report
2015 National guidance includes uncertainty and DAPP
2015 PCE report Preparing for SLR: Certainty & Uncertainty
2015 GWRC Climate change strategy

Major frequent floods, earthquakes over the past decade
Creating interest
Increase awareness with game
Experiment Hutt river
DAPP taken up

Lawrence & Haasnoot 2017
Iterative learning-based approaches as catalyst

“We make short-term decisions. This game showed we can make long-term decisions by anticipating and adjusting”

“We experienced uncertainty and could chart a pathway”

“We got better results through negotiation with the other groups”

• Shared understanding of system functioning
• Promising solutions that are flexible and adaptive over time
• Solutions through conversations
• Can adjust decisions as conditions change
• Built legitimacy, credibility and relevance
Next steps

• National roadshow to socialise changed practice
• Develop signals and triggers for monitoring
• More applications and hybridise with other DMDU tools e.g. MCA and ROA, RDM
• Research on cascading impacts to other domains e.g. governance scales, social and economic sectors
• Climate Change Adaptation Technical Working Group
• Climate Change Commission proposed by new NZ Government
• Watch this space!
Questions?