A climate risk researcher on the edge: Insights from working between science and practice.

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1. **Useful, useable and used:**
   - Lessons from a long-running national risk modelling tool programme

2. **The criticality of evidence based policy making**
   - ClimateXchange programme

“World of practice serves as a centre point of the academic compass” - Posner 2009

Co-understanding risk has been a core thread

From small scale people-centred to national scale models

Sri Lanka

South Africa

Indonesia

QR code for Full access to
the online course materials

Re-thinking Cultural Heritage & Climate Change Adaptation

by diversity of voices from:

- Sri Lanka: Environmental folklore and traditional climate knowledge systems
- South Africa: Historical Injustice and Elandskloof
- Indonesia: The heritage landscapes of Yogyakarta city

National example:
“She’ll be right”

Modelling Risk in Aotearoa New Zealand and the wider Pacific Islands

Earth Sciences New Zealand
(formerly GNS Science and NIWA).

https://www.riskscape.org.nz

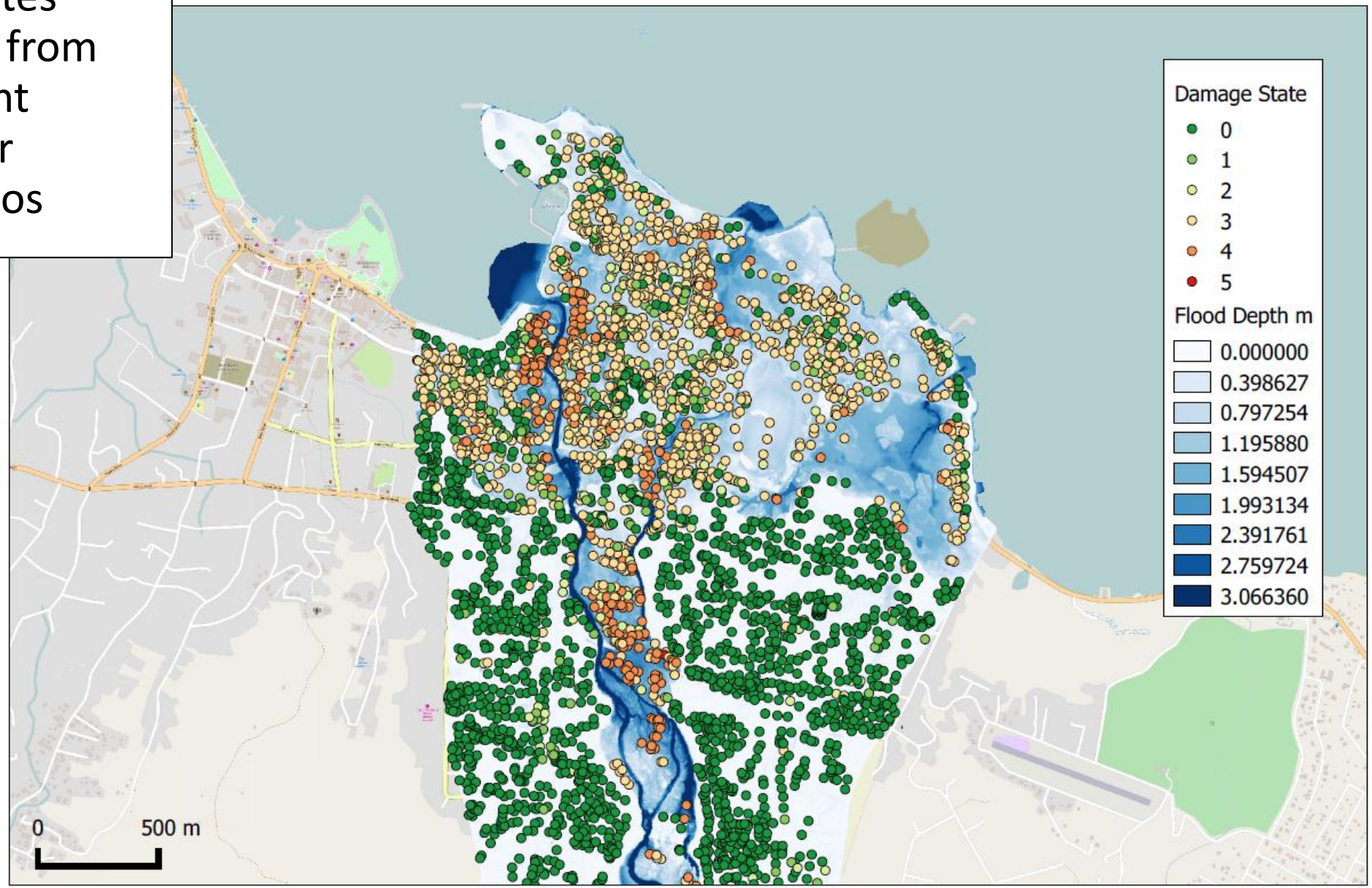
Useful, usable and used

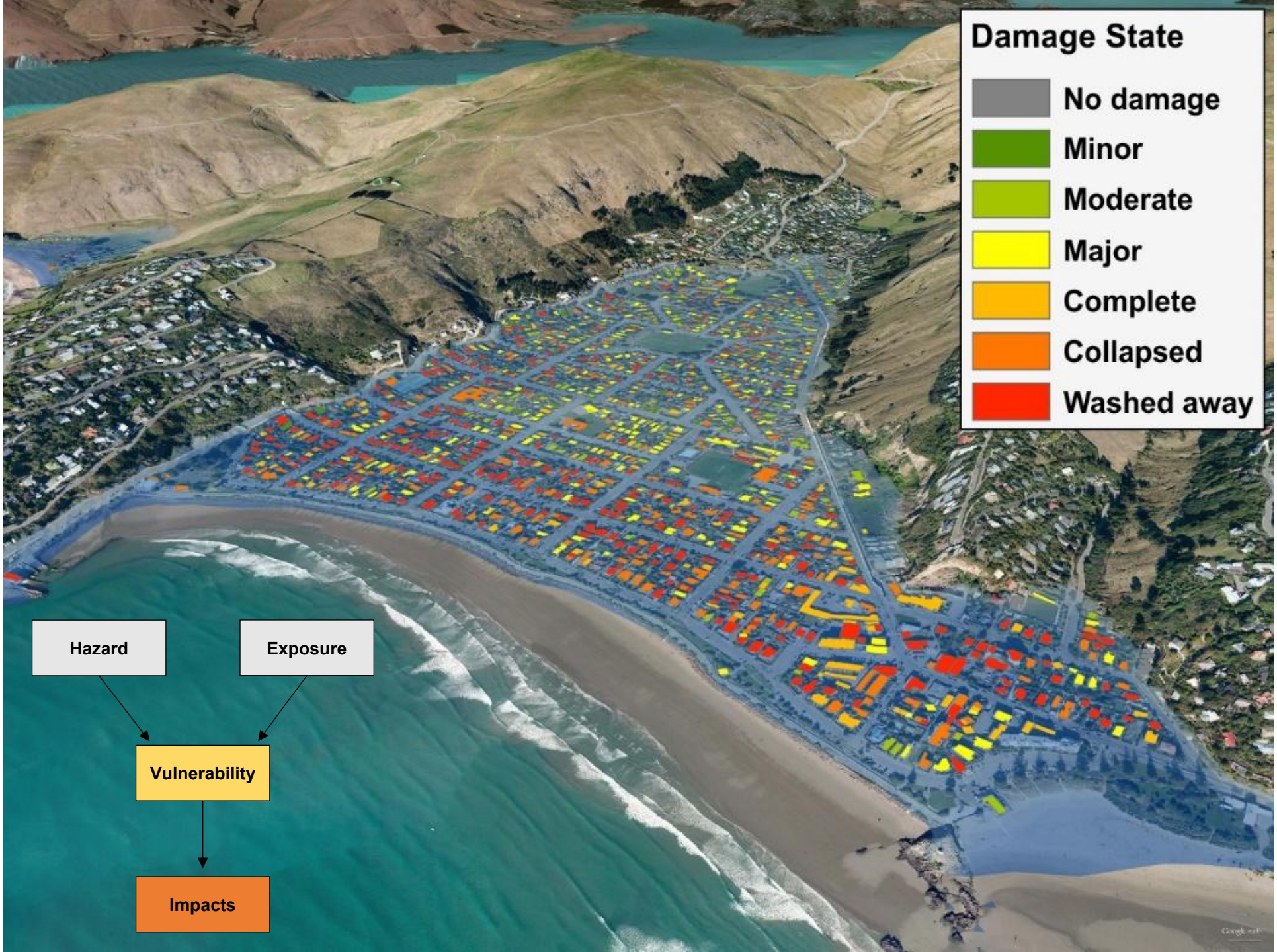
- A research programme to study the impacts of natural hazards on communities and to develop models from this research to forecast future impacts, used as the basis for;

- RiskScape modelling software that is an available tool that provides information about what could happen in a natural hazard event / disaster for end-users.

Ref: Paulik, R., Horspool, N., Woods, R. et al. RiskScape: a flexible multi-hazard risk modelling engine. Nat Hazards 119, 1073–1090 (2023).

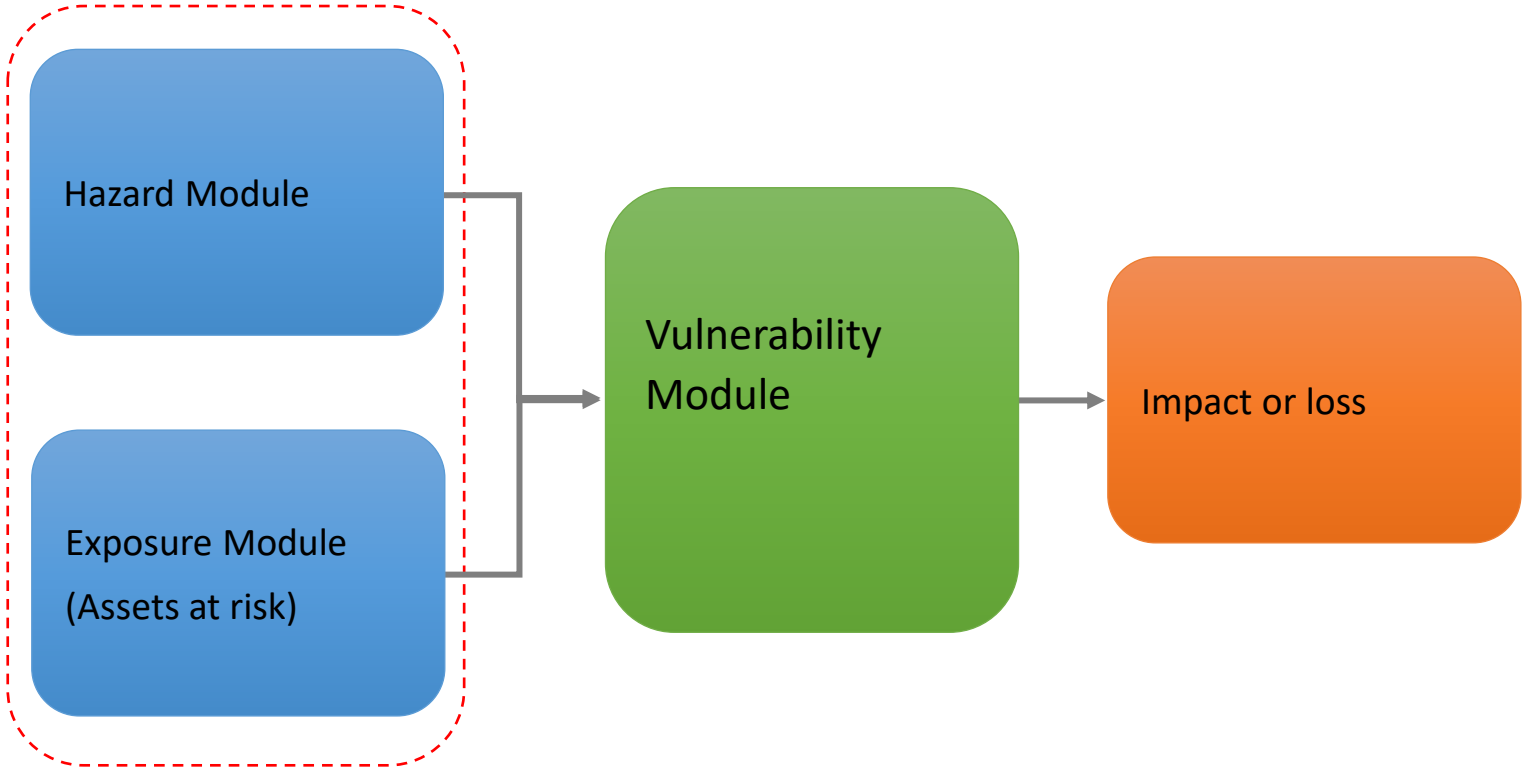
- Calculates impact from different disaster scenarios




Damage State
No damage
Minor
Moderate
Major
Complete
Collapsed
Washed away
Hazard
Exposure
Vulnerability
Impacts

Impact and risk tools

Just like the risk assessment process the tool uses information about hazards, exposure, vulnerability to calculate loss



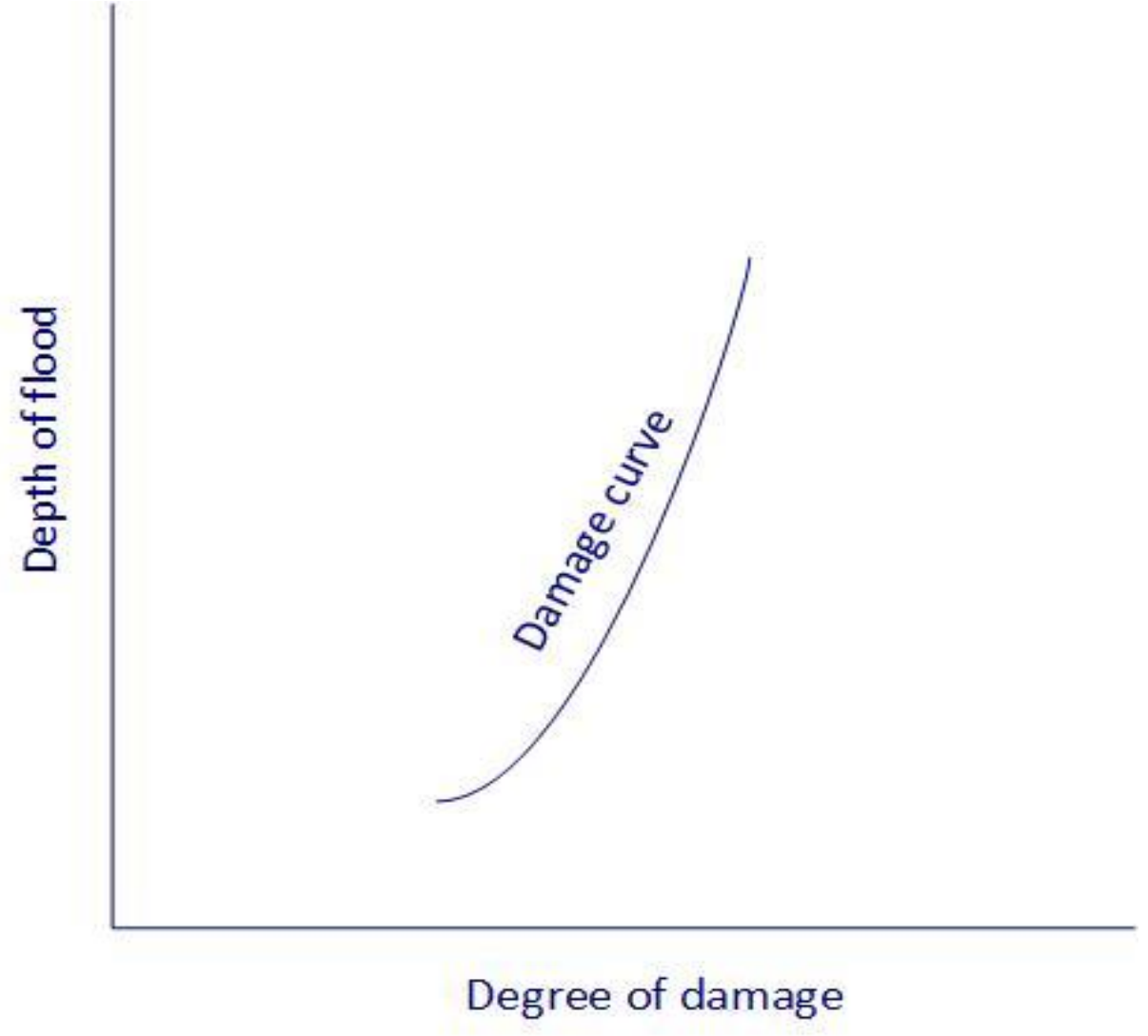
The Importance of Data

- RiskScape reads information relating to the hazard characteristics and the asset according for **the vulnerability model** to estimate potential impact.

- A vulnerability model represents what happens when a hazard meets an asset.

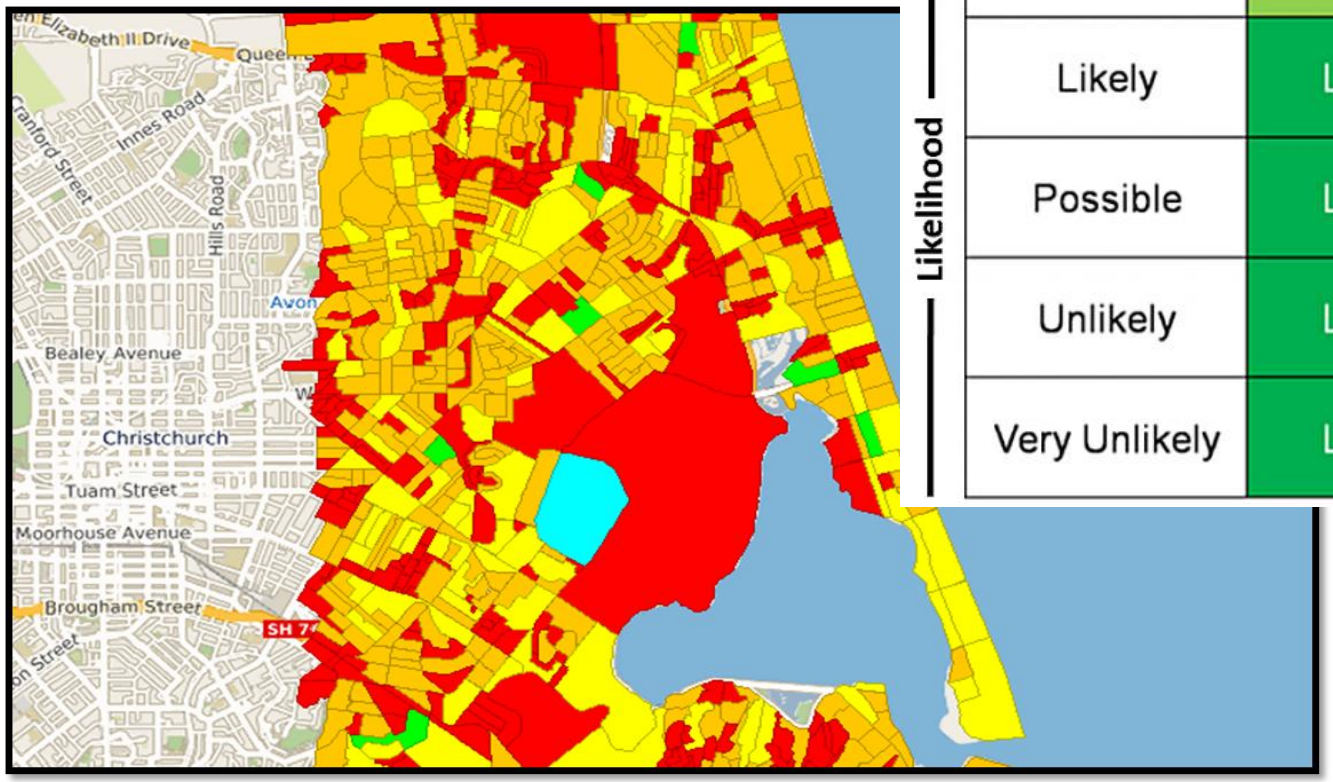
E.g. what happens when flood water flows through a certain type of building?

Vulnerability Models:
based on post event surveys, literature and expert opinion



Applications through a risk matrix

- Outputs vary depending on need driven by users and available research



Likelihood \ Impact	Negligible	Minor	Moderate	Significant	Severe
Very Likely	Low Med	Medium	Med Hi	High	High
Likely	Low	Low Med	Medium	Med Hi	High
Possible	Low	Low Med	Medium	Med Hi	Med Hi
Unlikely	Low	Low Med	Low Med	Medium	Med Hi
Very Unlikely	Low	Low	Low Med	Medium	Medium

A risk matrix used by regional authorities

A freely available tool = low uptake

- High data requirements – esp. in early years of project
- Technical knowledge requirements and no capacity building
- Lack of vulnerability models for different asset types
- Lack of standards across both risk data, asset types and outputs
- Lack of consideration re the translation and application of scenario outputs
- Lack of communication re uncertainty across risk pipeline and complexity of scenarios

https://www.gfdrr.org/sites/default/files/solving-the-puzzle-contributions.pdf

Pacific Islands

- Co-design of the tool for users needs
- Co-design of vulnerability models
- Post –event damage survey tools that are interoperable with RiskScape
- Vocational training and capacity buildings
- Show cases

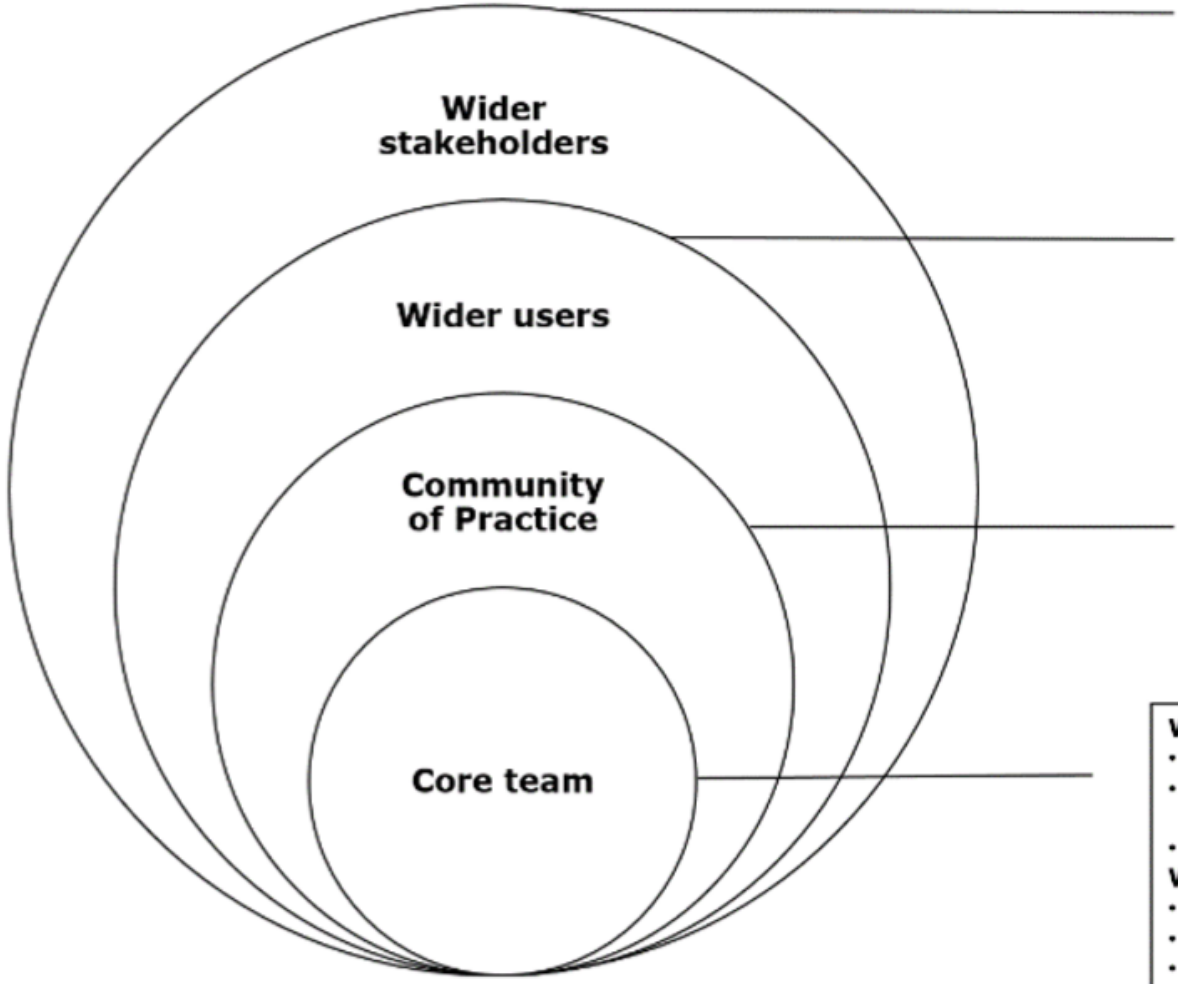
No data? Co-creation vulnerability models

- Risk assessment training
- Vocational training with RiskScape team

- Case study: sector-based x-government workshops
- Data sharing and management- MoUs !!
- Data collection app
- Understanding impact thresholds and adaptive capacity in context

- Lots of post it notes, lots of flip chart paper and building relationships

Capacity Building



Who:
- Influencers, influenced and future users

What:
- Project dissemination and communications

Who:
- Critical influencers - providers and receivers of risk-based information
- Advisory groups
- Decision makers

What:
- Generic DRM and DRR training
- with risk modelling modules
- University trainings and engagement

Who:
- Target beneficiary: regular risk-based information and tool users

What:
- Basic and advanced training
- Accompaniment to develop scenarios

Who:
- Target beneficiary
- Lead in-country, regional and New Zealand based organisations
- Technical specialists

What:
- Analysis and review
- Training of trainers
- Advanced vocational training
- Case study/scenario development
- Technical/research development
- Activity coordination and management

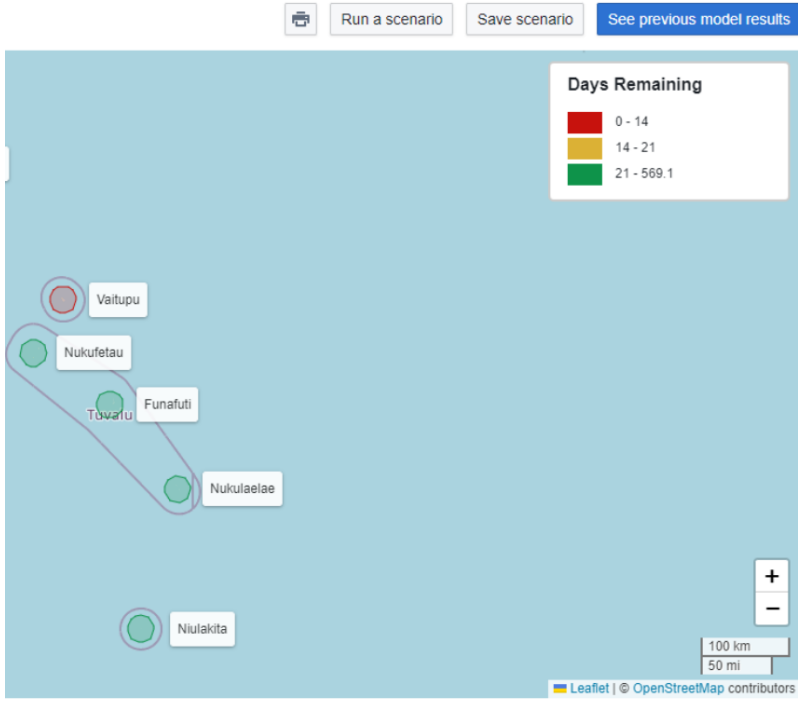
Original Use Cases

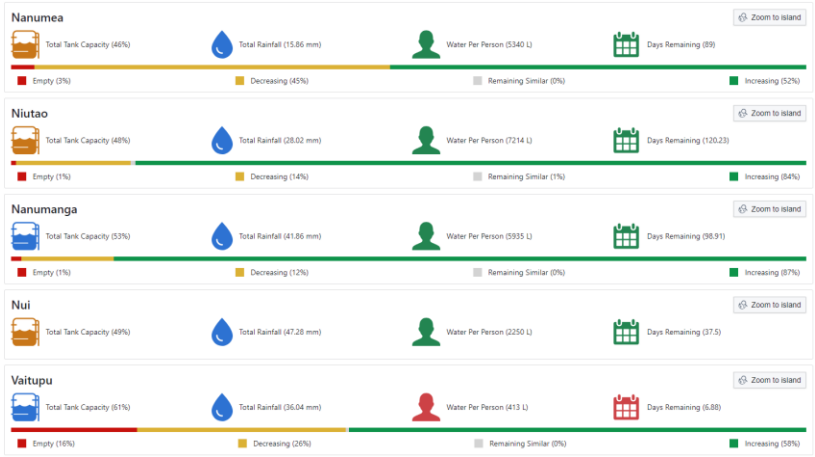
- The landslide case study in Samoa is being used by the Government to demonstrate the potential impacts on Mount Vaea.

- The Planning and Urban Management Agency (PUMA) will use this information to inform land use development.

Creativity and expansion in the Pacific

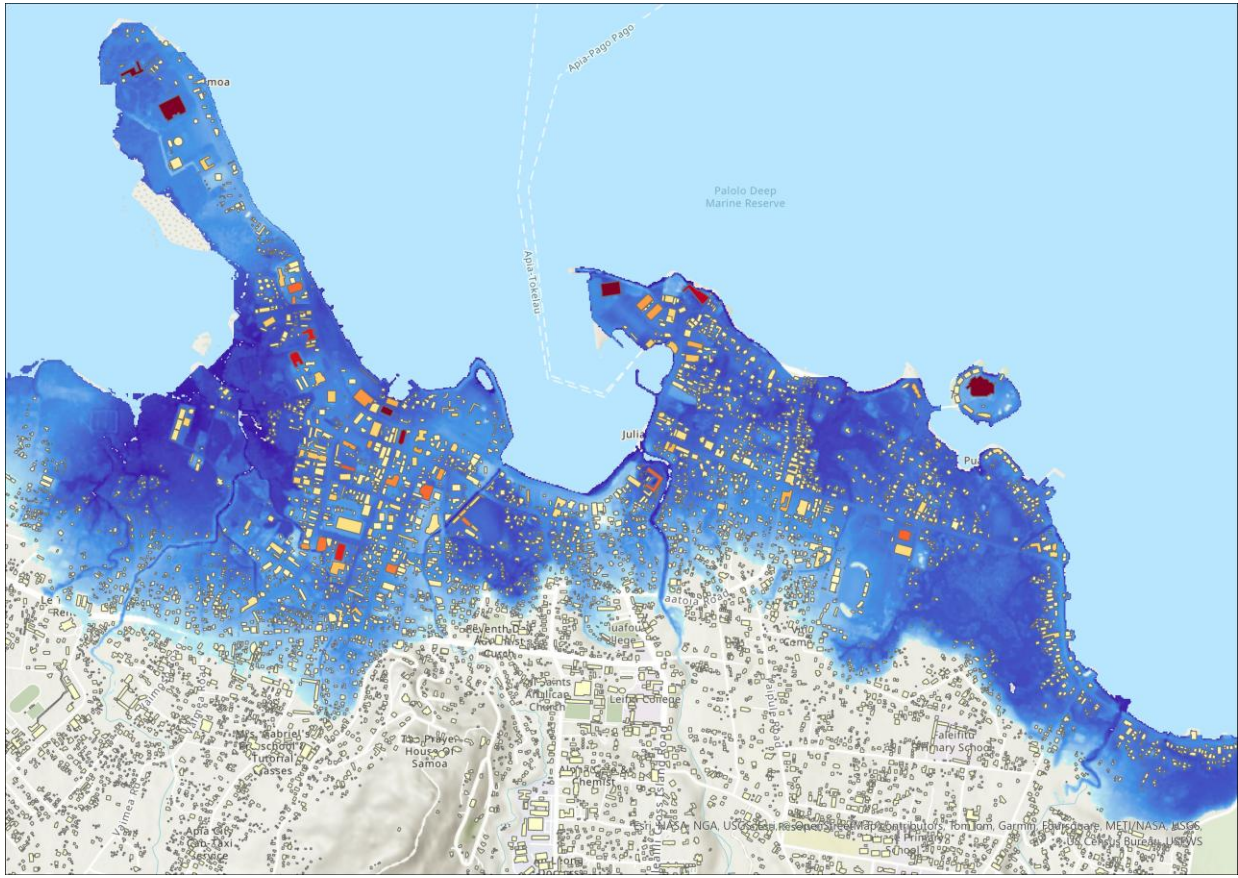
- Marshall Islands and Tuvalu
  - Water Resource Monitoring
    - estimates the amount of water available based on consumption and rainfall
    - Dashboard output
    - HH, island and national





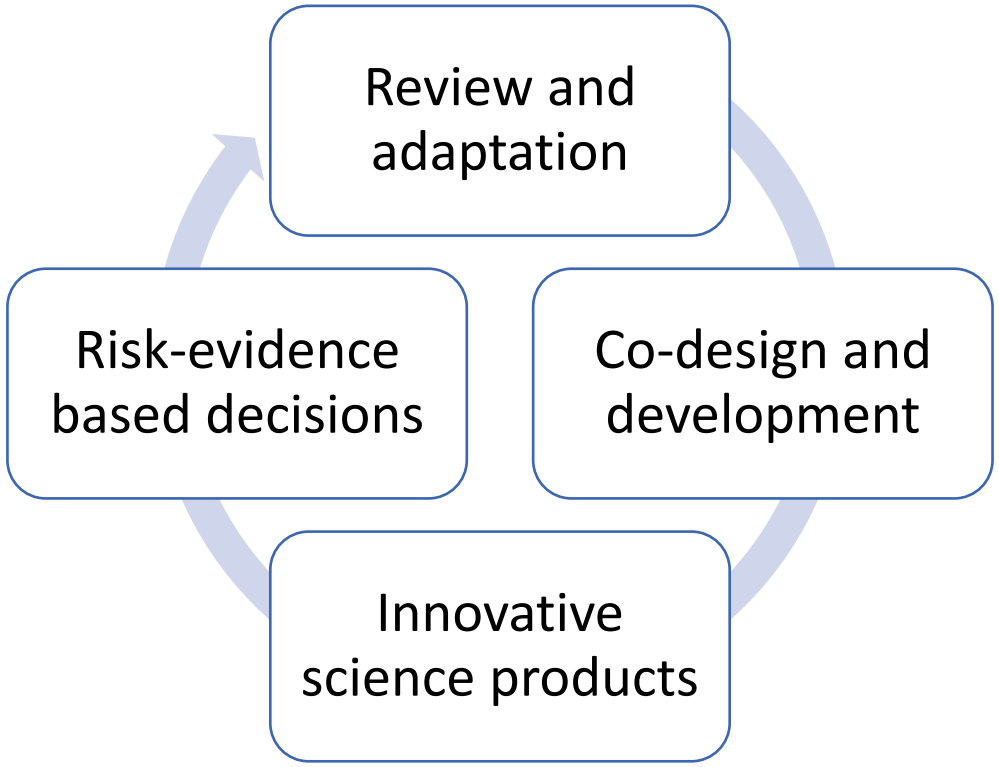
RiskScape has evolved, learnt and shared lessons

- Placing the user at the centre
- Refocussing research for delivery
- Demonstrations, training and capacity building (incl. Universities)



Future directions and opportunity

- Pathway to risk informed decision making:



- Longitudinal research - trust
- Practitioner driven risk tools/ plugins
- Direct and Indirect loss understandings
- Māori Iwi integrated risk assessment
- Impact forecasting
- ‘Absent’ sectors e.g. Agriculture, flood
- Climate change adaptation and Mitigation research and new tools
- Mulithazard impact modelling research

What's 'still' not working?

- Current PhD: Pathways of risk science for policy in New Zealand

- Assume that information feeds into a resilience systems architecture – but fragmented and siloed
- Assumes a resilience system architecture exists and functions
- Consultancy vs freely available
  - Public science for public good
- Interoperability

- Questioning whether Understanding Risk is Priority 1

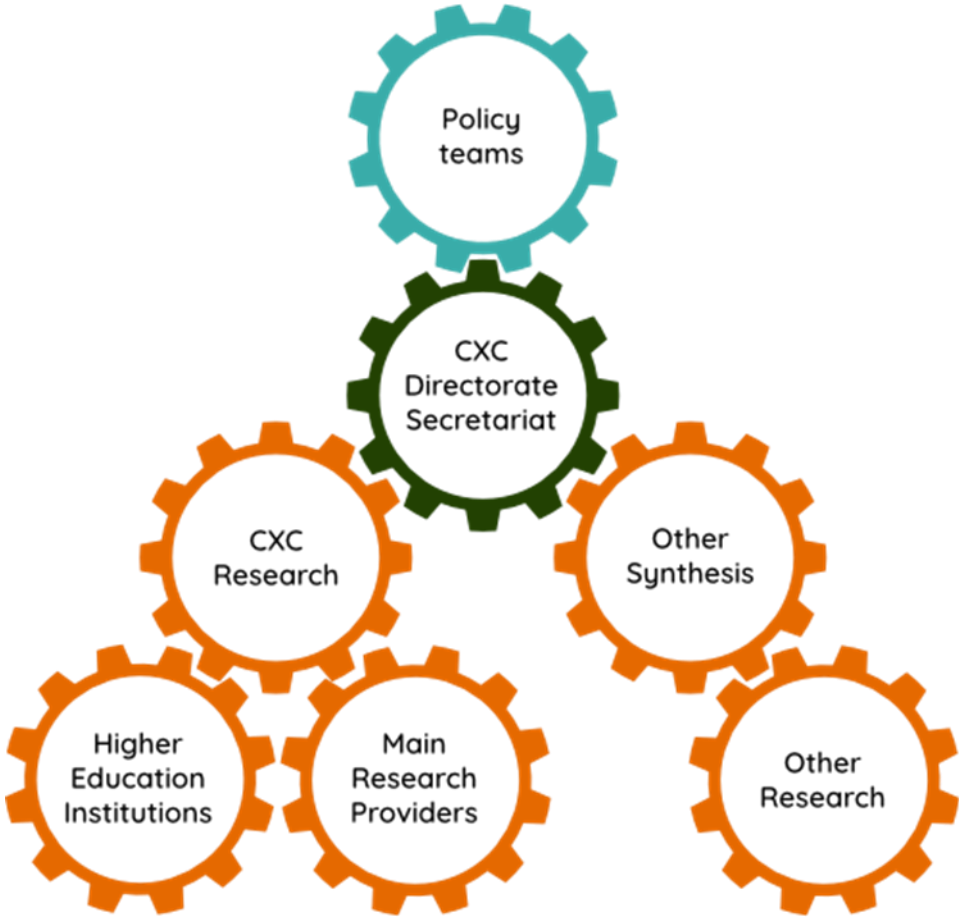
- S.Schubert-2@sms.ed.ac.uk

Criticality of evidence based policy making…

- We are under threat
- Assumptions that policy makers and practitioners have time, capacity, opportunity, and a pull for risk information
- The role of, and language of, knowledge exchange, mobilisers and brokers.
- Knowledge brokerage has evolved as a field of practice and is increasingly recognised as a critical area of analysis in policy studies

ClimateXChange

- Scotland's centre of expertise on climate change
- Funded through the Scottish Government's Rural and Environment Science and Analytical Services Division (RESAS) since 2011
- Based at institutes across Scotland with headquarters in the Edinburgh Climate Change Institute, University of Edinburgh



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ClimateXChange – Directors

Our four CXC Directors are responsible for :

- providing strategic direction
- managing our knowledge exchange and research
- ensuring effective delivery of project outputs

Dr Kate Donovan
Director – Policy
Theme lead: Risk and adaptation
Chair of the Directorate

Professor Pete Smith
Director - Science
Theme lead: Land use

Professor Lee-Ann Sutherland
Director - SEFARI Institutes
Theme lead: Rural policy and economics

Professor Stuart Galloway
Director - Higher Education Institutions
Theme lead: Energy

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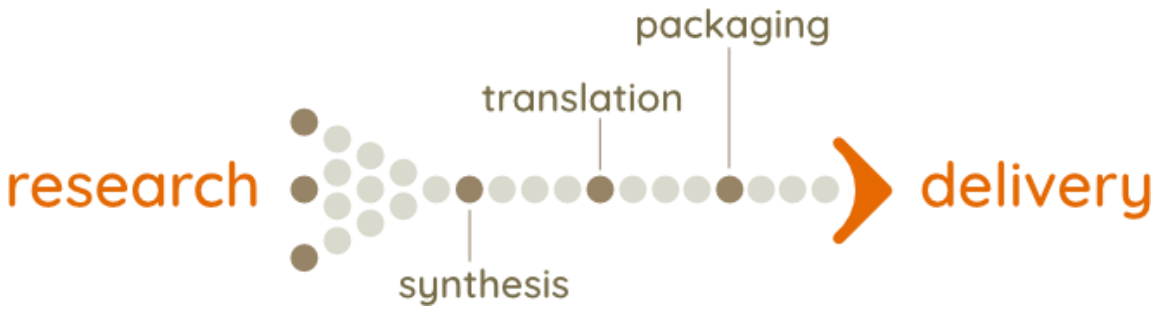
Research Fellowship situated within SG team
(typically 6-9 months duration)

Workshops, facilitated discussions, knowledge exchange (KE) events or round-tables to explore issues, identify research gaps or share/discuss research findings
(during or separate from individual research projects)

Commissioned research projects
(typically 2-9 months duration)



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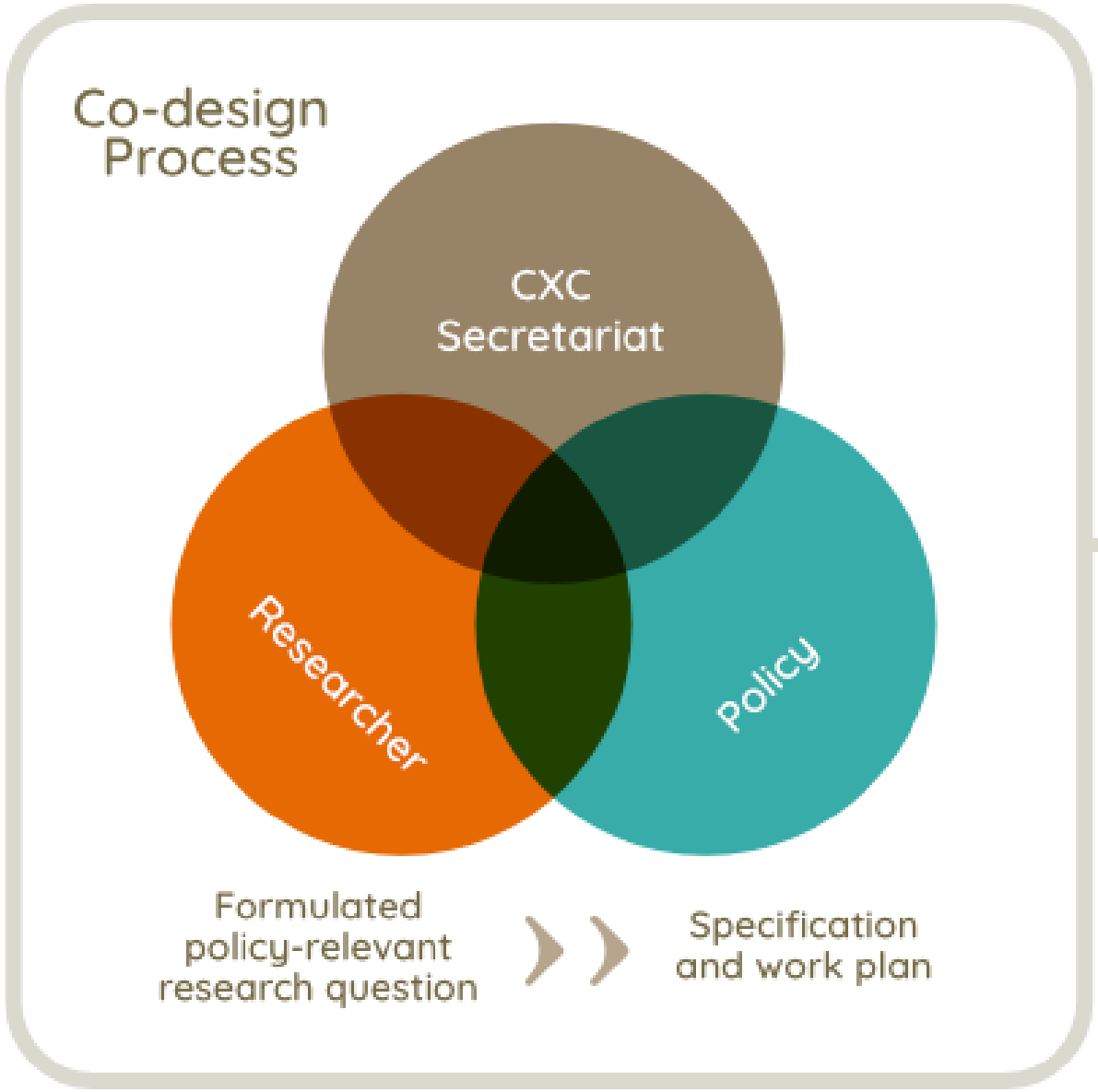
Request from policy team 'Call Down'

OR

Follow-on from existing project

OR

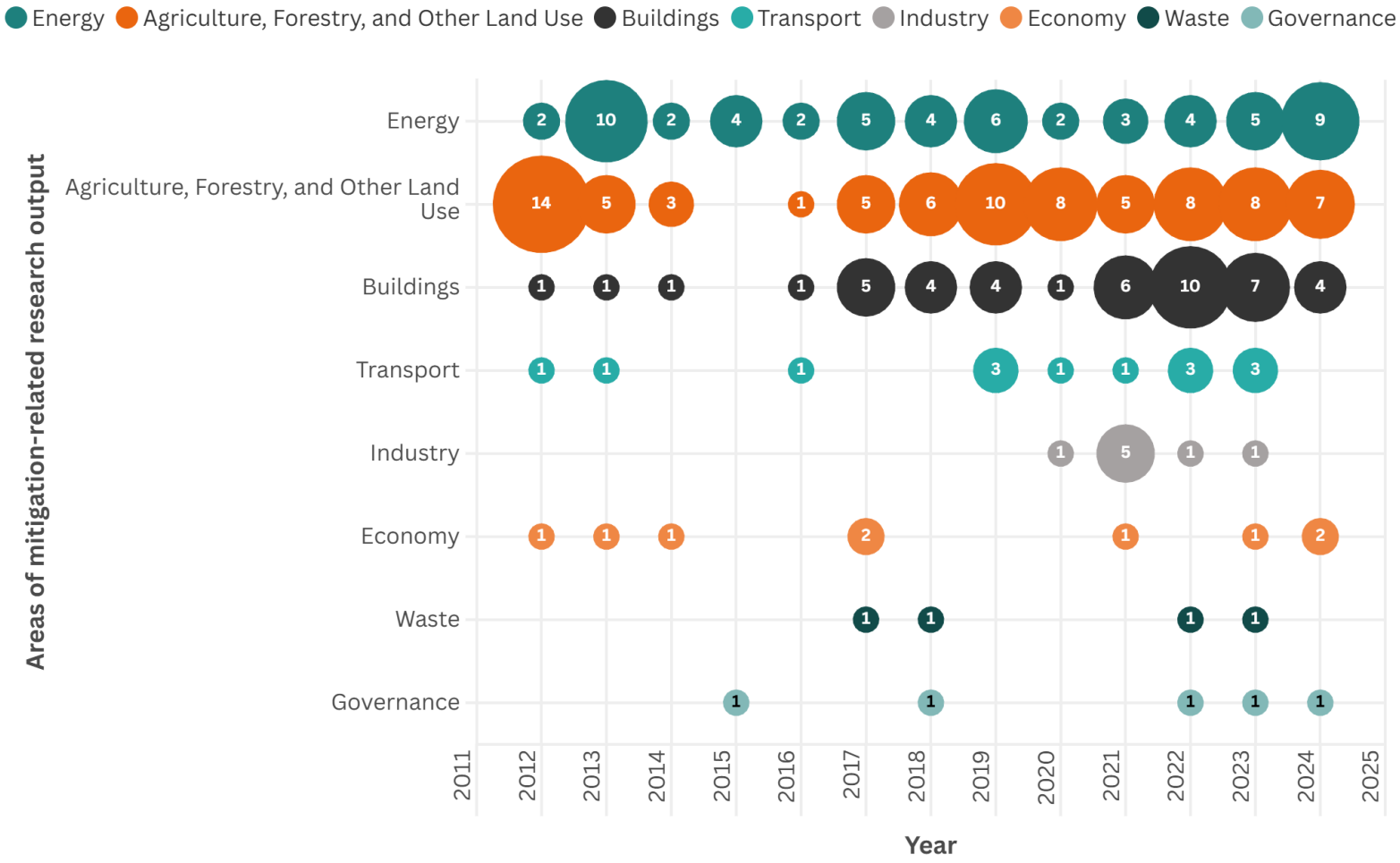
Ongoing dialogue with policy team



Project Work and Outputs

Evolving evidence demands for Scotland's Climate Change Policy

- Dr Ashrika Sharma mapped CXC publications along a timeline from 2011 to 2024 (396 publications)
- This study explored how the evidence needs have evolved within Scottish Government (SG), by analysing ClimateXChange (CXC) publications.
- Majority related to mitigation



Full report available on CXC website: Sharma and Donovan (2026) https://doi.org/10.7488/era/6857

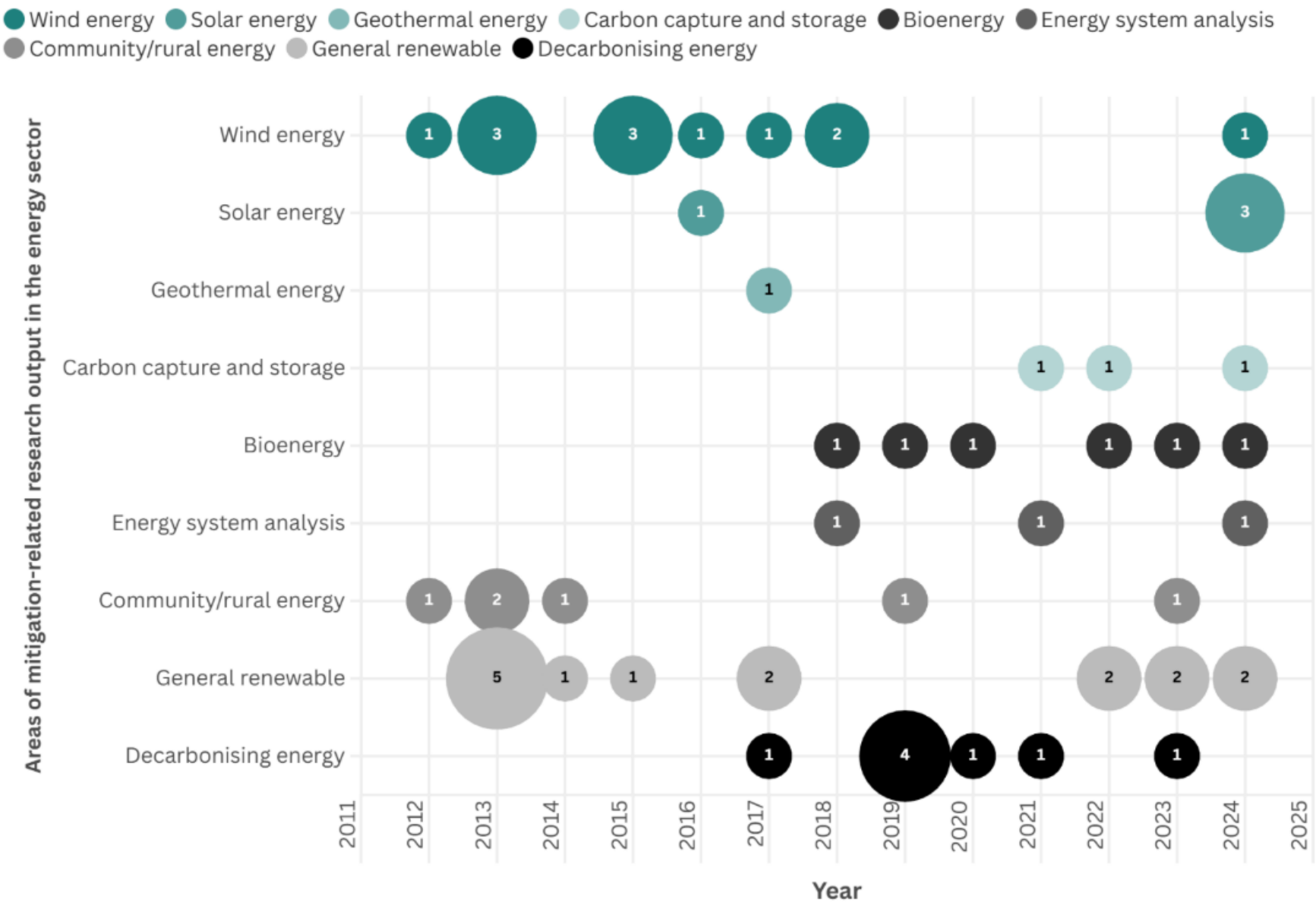


Figure 5: Distribution of mitigation-related research outputs across the energy sector from 2012 to 2024, with bubble size representing number of outputs.

What has been the nature of evidence demands?

Instrumental Evidence	Conceptual Evidence	Anticipatory Evidence
• Highly specific in its demands, seeking a clearer explanation of the problem at hand, the most effective ways to address it, the available alternative options • Tools, Technologies, Strategies, Best practices, Comparisons, Effectiveness	• To understand emerging or complex issues that may not have immediate policy applications but are crucial for long-term strategic thinking • Exploring new paradigms in climate governance that go beyond technological solutions.	• A shift away from mature and emerging evidence to anticipatory evidence. • Anticipation of impact, behavior and scrutiny

Full report available on CXC website: Sharma and Donovan (2026) https://doi.org/10.7488/era/6857

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Future Trends

- Increasing adaptation and resilience asks
- Increasing behaviour change and health related
- Increasingly inter- cross disciplinary
- Increasing ‘capacity’ asks
- Support for KE fellowships and training
- Rapid research still a key USP
- Rapid Q&A emerging (turn-around in days)

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Take-aways

Clearer pathways, harder trade-offs: While climate targets are better defined, governments face increasingly complex and uncertain questions; especially balancing rapid transitions with social equity and justice.

Dynamic policy processes: Climate governance now emphasizes experimentation, social learning, and continuous feedback, requiring policies and policy process to remain adaptive and iterative.

Evolving role of knowledge brokers: Brokers must navigate contested policy spaces, engage with diverse epistemologies, and co-produce knowledge that is both robust and politically relevant—yet existing institutions may lack the flexibility and agency to fully meet this challenge.

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Strongest as the weakest

- New forum of infrastructure operators, owners and researchers
- Work together on:
  - Climate Risk
  - Interdependencies
  - Cascading risk
- https://adaptation.scot/our-work/climate-ready-infrastructure-scotland-forum/

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UK Research and Innovation

Hazard and Resilience Policy Fellowship

- Blending risk modelling knowledge and policy support
- Support DENZ embed climate risk and resilience research
- Support the CS-N0W 2 programme start-up
- Working with specific teams to understand their climate risk information needs
- Identify tools that can play a role for energy mission resilience
- *Fellowships focused on natural hazards to support future national resilience, supported by the Department for Culture, Media and Sport as part of the COVID-19 Commemoration programme.*

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Scotland's centre of expertise connecting climate change research and policy

www.climatexchange.org.uk

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Thank you

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