

UNHaRMED: Developing disaster risk reduction strategies through partnerships, workshops and integrated modelling of future risks

Presenters: Tim McNaught (DFES), Tristan Whiting (DPLH) & Doug Radford (UoA)

Acknowledgments: Holger Maier, Hedwig van Delden, Aaron Zecchin, Roel Vanhout, Sam Culley and Alice Miller, Tim Donohue



Department of **Planning,
Lands and Heritage**



THE UNIVERSITY
of ADELAIDE

Presentation Questions

How do **we** manage natural hazard risks in an uncertain future?

How do **we** translate research in this space to practice?

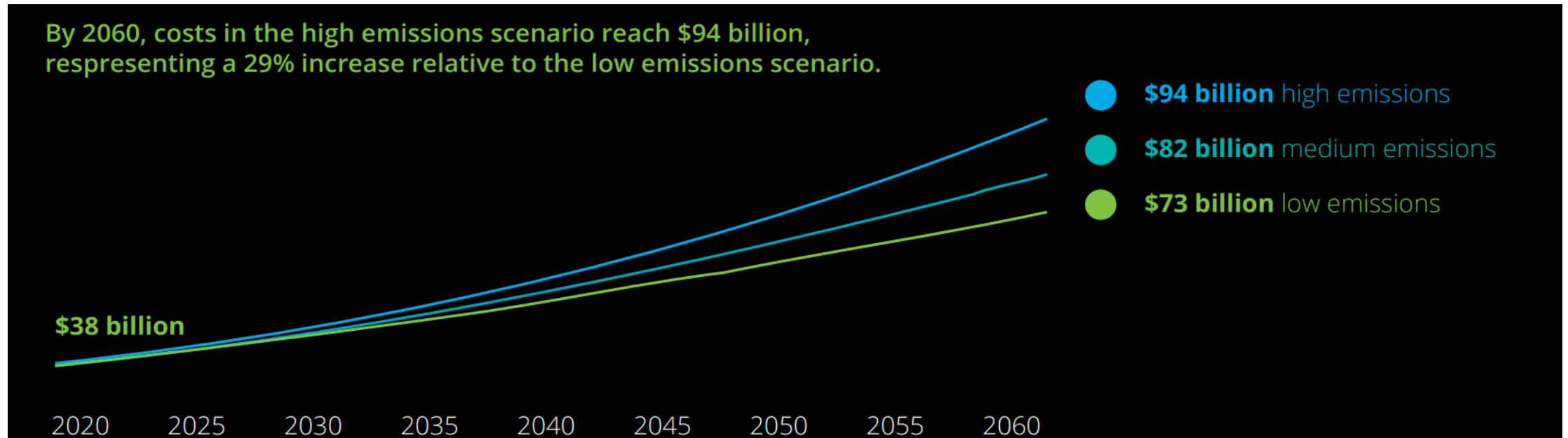
How do **we** build capacity within our agencies to apply this practice?



**NATURAL HAZARDS ARE COSTLY AND
THINGS ARE GETTING WORSE**

The Cost of Natural Hazards

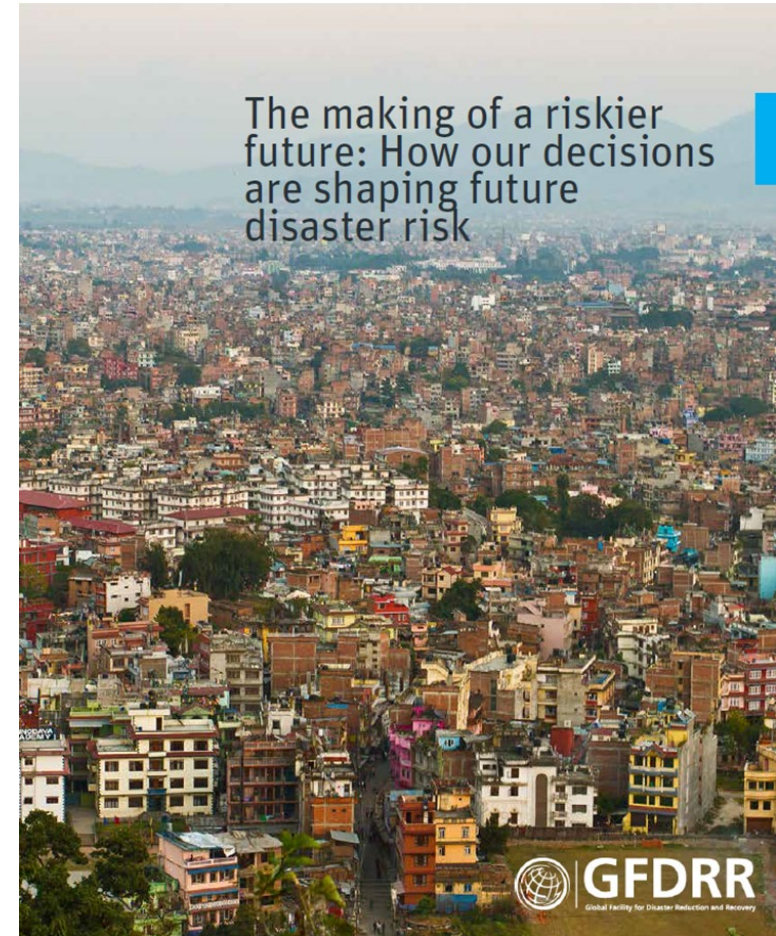
- Natural hazards currently cost Australia **\$38 Billion per year**
- This cost are forecast to rise to at least **\$73 billion per year by 2060**
- The main drivers are population growth, climate change and property value growth.



Tomorrow's risk is built today

Tomorrow's risk is being built today. We must therefore move away from risk assessments that show risk at a single point in the present and move instead towards risk assessments that can guide decision makers towards a resilient future.

Global Facility for Disaster Reduction and Recovery (2016)



Prevention is better than cure

*“Better to build a fence at the top of a cliff,
than park an ambulance at the bottom”*

Helen Clark 2015 Sendai

Where do we build fences?

When do we build fences?

How high should the fences be?



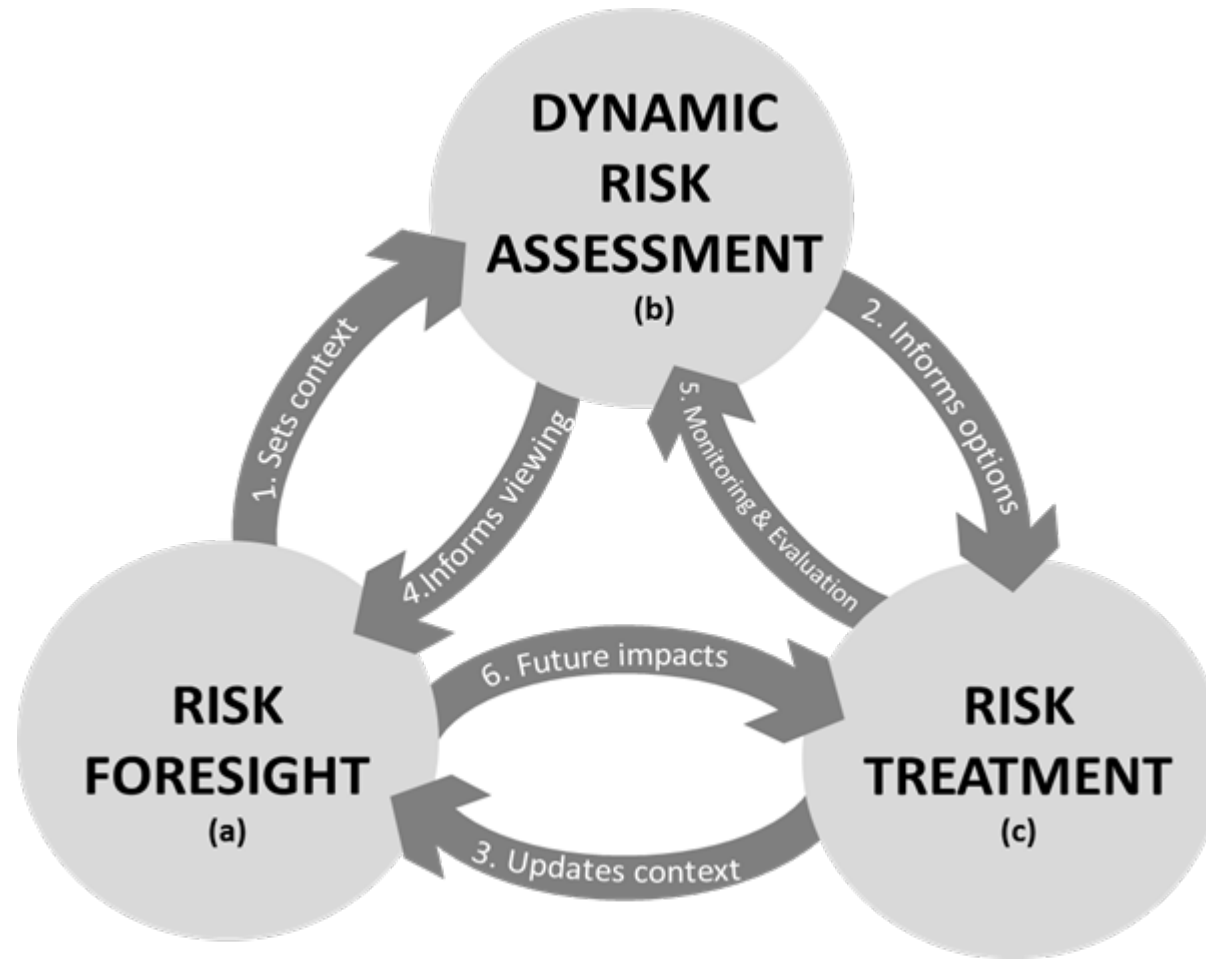
What is UNHaRMED?

Unified Natural Hazard Risk Mitigation
Exploratory Decision support system

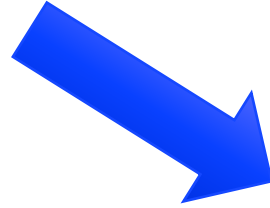
- A tool for pro-active disaster risk assessment and reduction planning
- Interactive modelling platform to assist decision making, investment choices and mitigation measures
- Aims:
 - Improve thinking about risk into the future;
 - Better manage and minimise risk;
 - Increase transparency, efficiency and effectiveness in decision making
 - Position organisations to best achieve this and advocate to others.

We can assess how risk will change and what risk reduction portfolios are most effective in different plausible future worlds using a “policy wind tunnel”

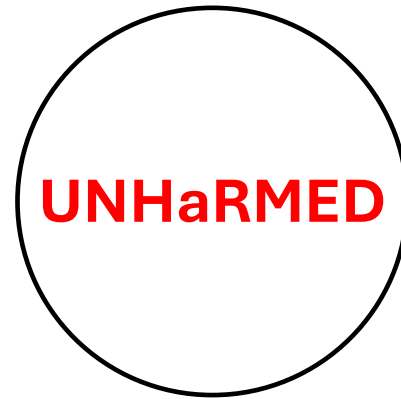
What is the risk reduction and resilience model informing UNHaRMED?



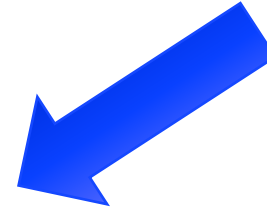
Things we generally
cannot control



- Global Climate change
- Population growth
- Global economy
- Technological disruption



Things we generally
can control



- Land use planning
- Land management
- Building codes
- Structural measures
- Community education

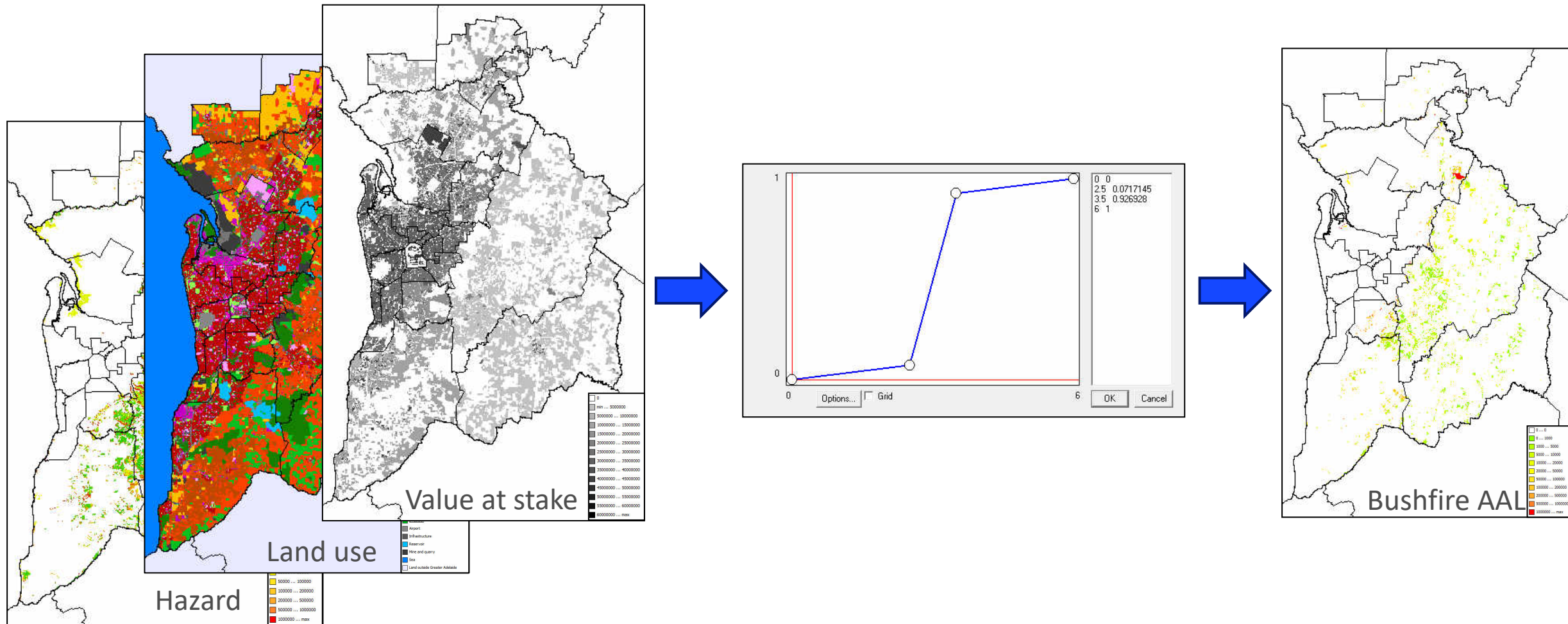


HOW DO WE QUANTIFY IMPACTS?

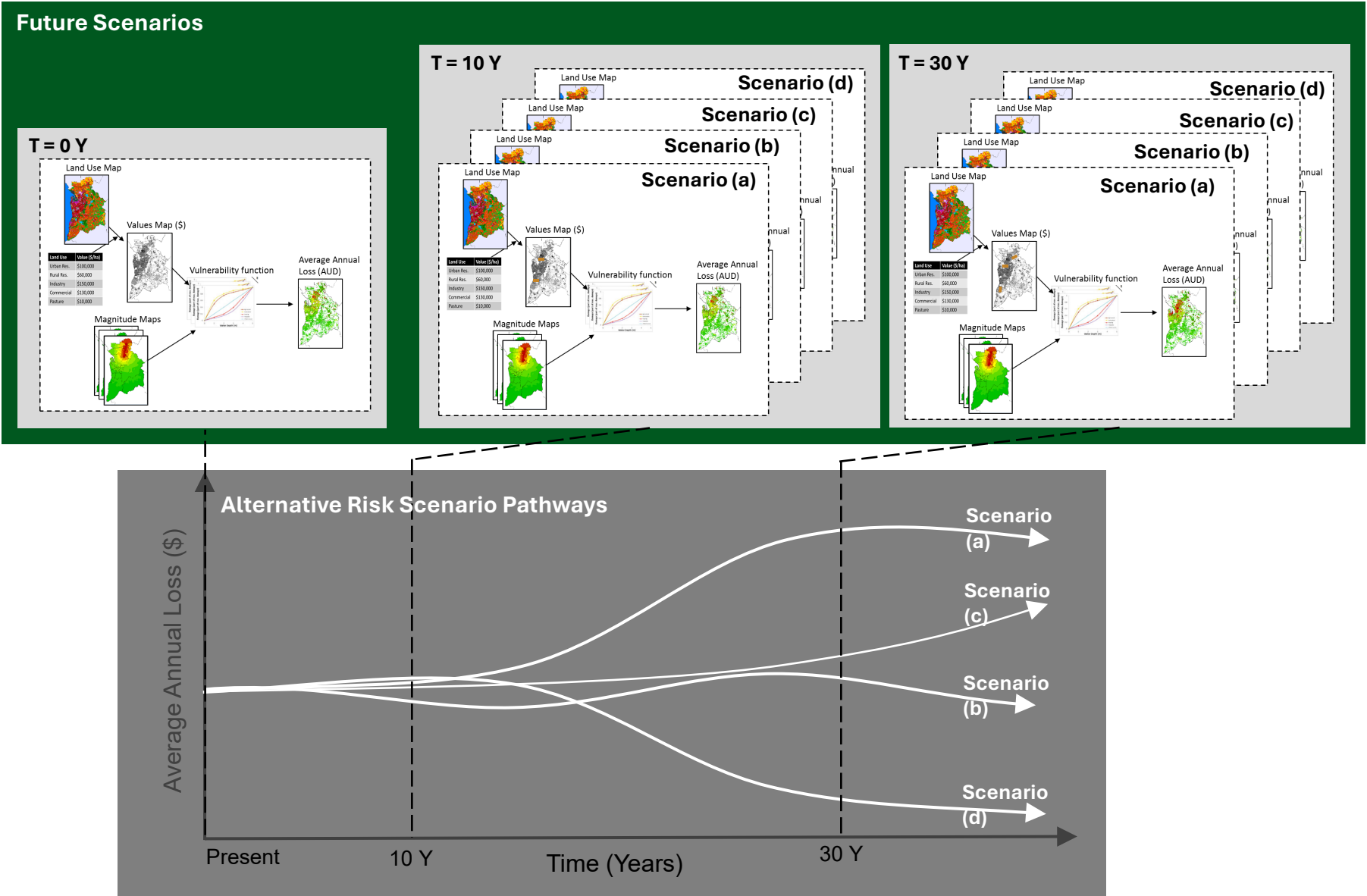
HOW DO WE OBTAIN EVIDENCE / DATA TO SUPPORT DECISION-MAKING?

UNHaRMED Risk Assessment

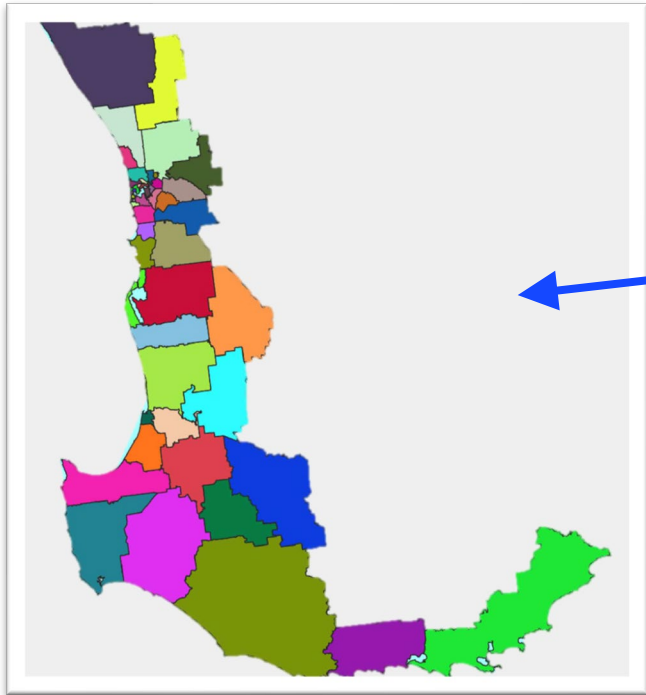
Considers long-term dynamics and uncertainties of hazard, exposure and vulnerabilities



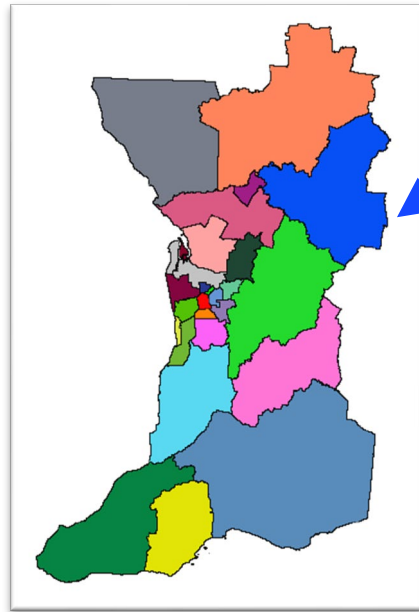
Simulating into future



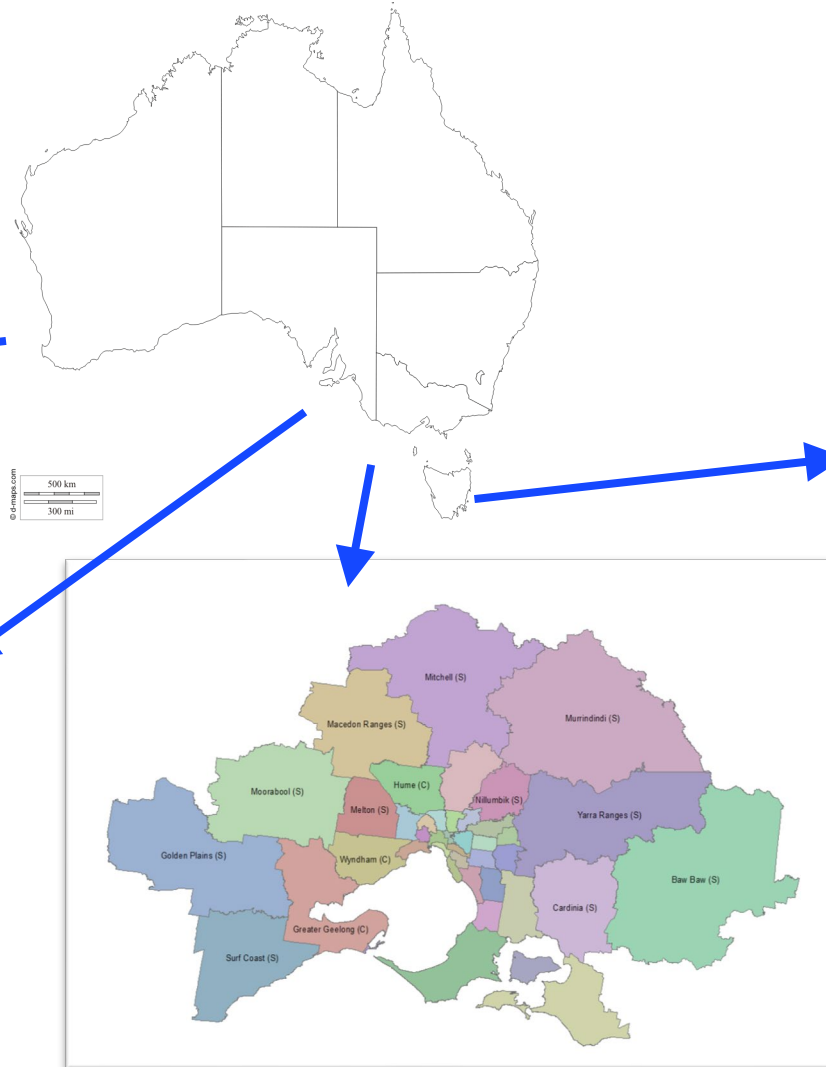
UNHaRMED Development - Bushfire Natural Hazards CRC



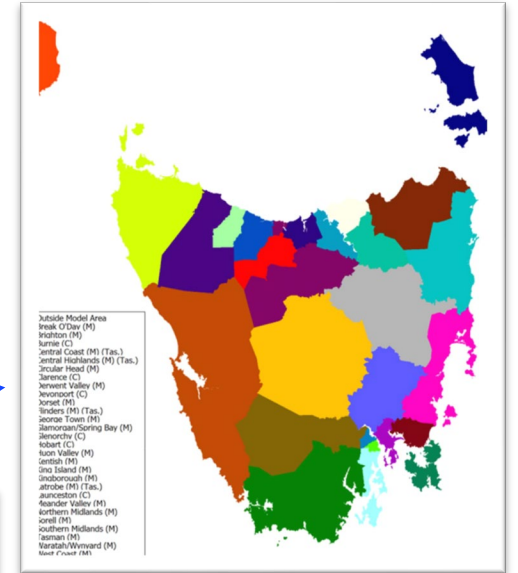
South West WA



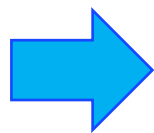
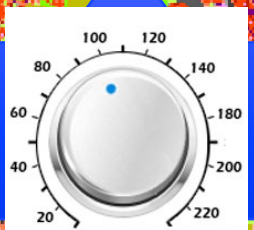
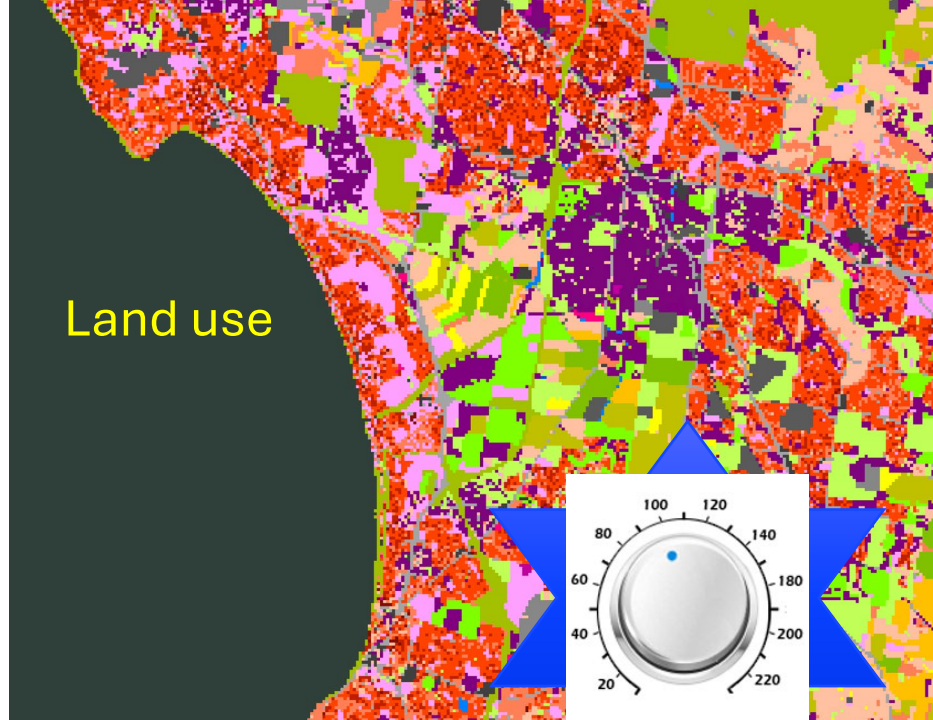
Adelaide



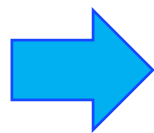
Melbourne



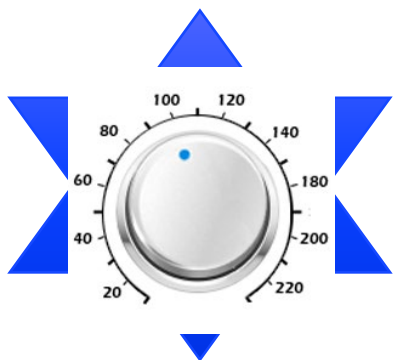
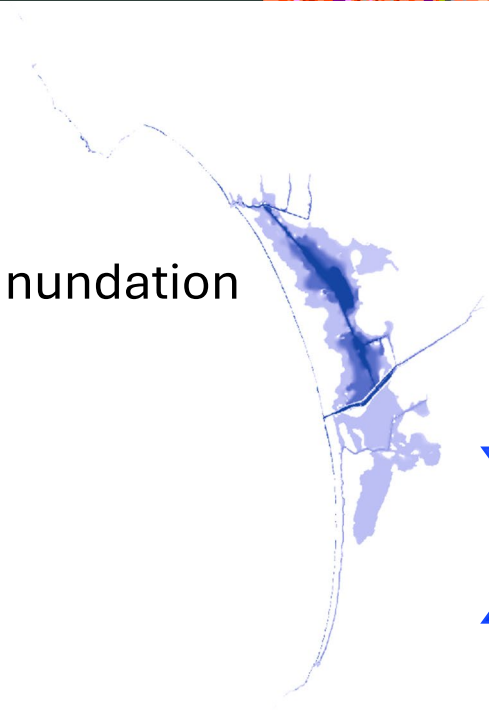
Tasmania



Building value

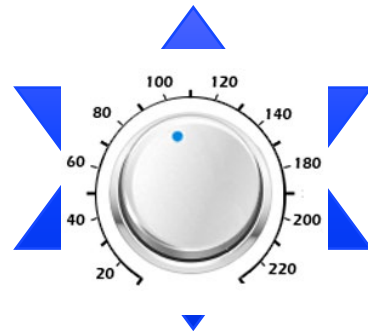
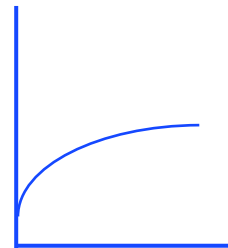


Inundation

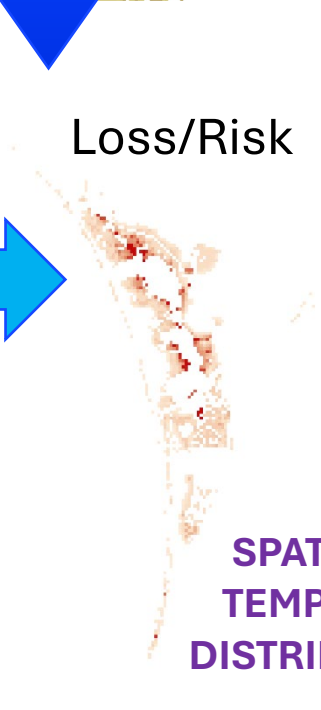


Building vulnerability curves

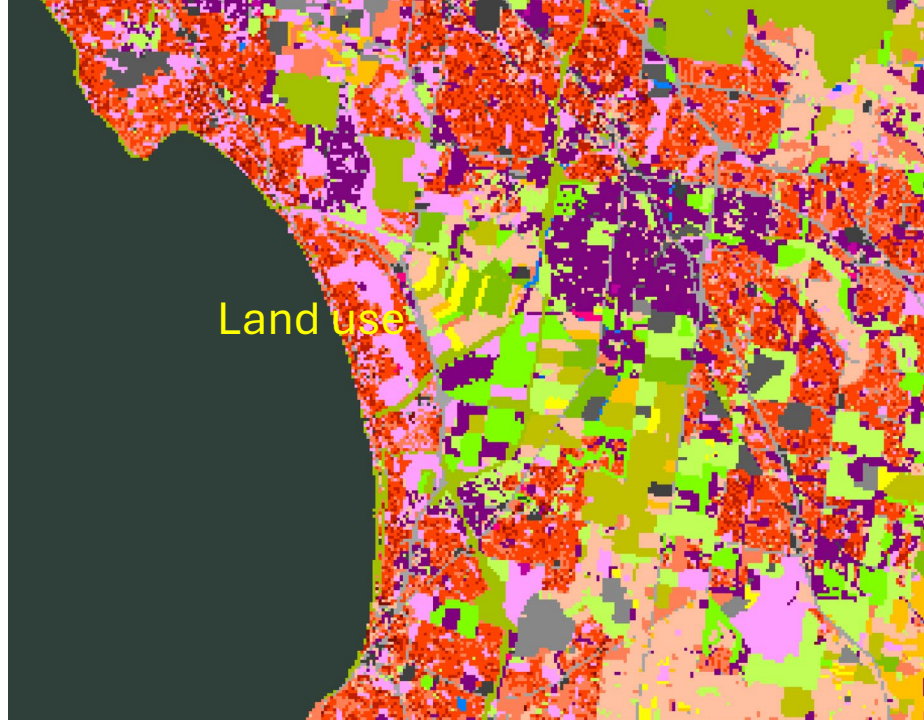
Damage



Loss/Risk

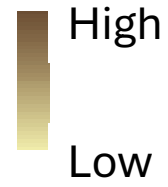


SPATIAL &
TEMPORAL
DISTRIBUTION



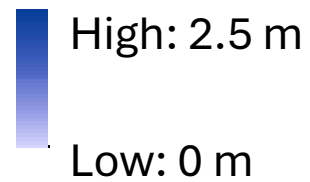
- Vacant
- Nature
- Forest
- Rural Residential
- Low Density Residential
- Conventional Density Residential
- Medium Density Residential
- High Density Residential
- Tourism and Accommodation
- Office
- Retail / Commercial
- Industrial
- Community Services
- Forestry
- Intensive Agriculture
- Pasture
- Livestock
- Horticulture
- Mixed Farming and Grazing
- Extractive Industries
- Service Infrastructure
- Airports
- Ports
- Road and Rail Infrastructure
- Government
- Aquaculture
- Water
- Outside Area

Building value

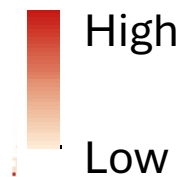


2015

Inundation



Loss/Risk



UNHaRMED IS A PROCESS – BRINGING
TOGETHER PEOPLE, DATA, MODELS AND
SOFTWARE

Benefits of incorporating UNHaRMED

- Social learning occurs when stakeholders, modellers and facilitators explore and evaluate policy, planning and investment options through group interaction
- Development of shared understanding of risks, how they interact and what can be done about them
- Understanding of relative importance of different factors in specific decision contexts
- Development of flexible, adaptable pathways to reducing disaster risk
- Builds strategic capacity by exploring future risk profiles and engages participants across government



WA Case Study – 2017 to 2022

- Involved 11 State Government agencies, two universities and WALGA
- Component of introduction and training to UNHaRMED prototype software
- Three case studies – Albany (earthquake, bushfire and coastal inundation), Busselton (coastal inundation and bushfire) and Shire of Serpentine-Jarrahdale (bushfire)
- Subsequent integration to Western Australian Climate Change Policy and Climate Adaptation Strategy.



From Research to Practice

Tristan Whiting (DPLH)

WA Climate Policy settings - Our response to climate change & incorporating tools into decision making

- Recognition of needs at state policy level (WA Climate Policy, 2020 & Climate Adaptation Strategy)
- Continuity of partnerships and collaboration.
- Leadership from agencies & having Project advocates.
- Broader trend of more investment in prevention and mitigation to compliment response and recovery.

Western Australian Climate Policy

A plan to position Western Australia
for a prosperous and resilient
low-carbon future

► Develop and implement UNHaRMED for risk reduction

Collaborate with the University of Adelaide and the Bushfire and Natural Hazards Cooperative Research Centre to develop and implement the Unified Natural Hazard Risk Mitigation Exploratory Decision (UNHaRMED) support system tool to assist in reduction of risks from natural hazards, including bushfires and coastal erosion and inundation.



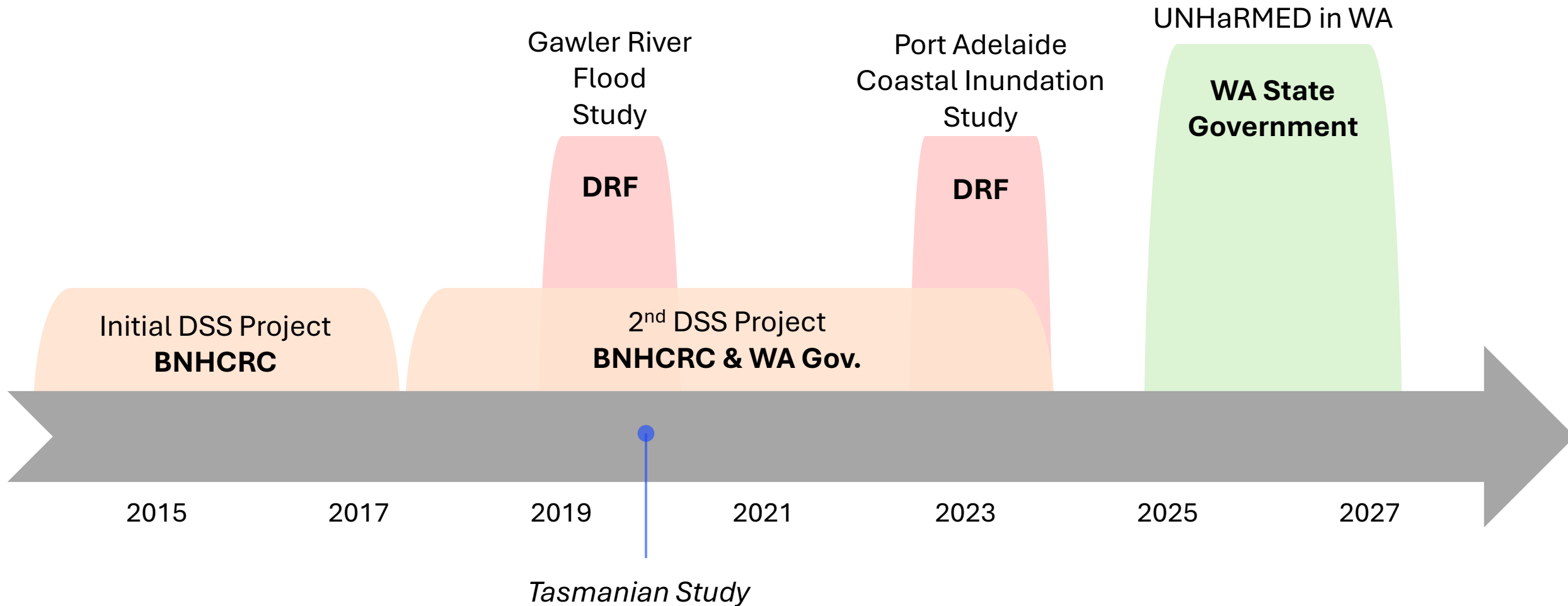
Climate Adaptation Strategy

Building WA's climate resilient future

July 2023



UNHaRMED – Development Timeline



**How do we enable
liveable and
resilient futures?**



WA UNHaRMED

A Capacity Building Project

Tristan Whiting (Project Manager – DPLH)

WA UNHaRMED Project with DPLH

Build capacity & understanding: For local and state government by using an inter-agency stakeholder approach.

Capacity Building Activities

Informal

*“Learn by
doing”*

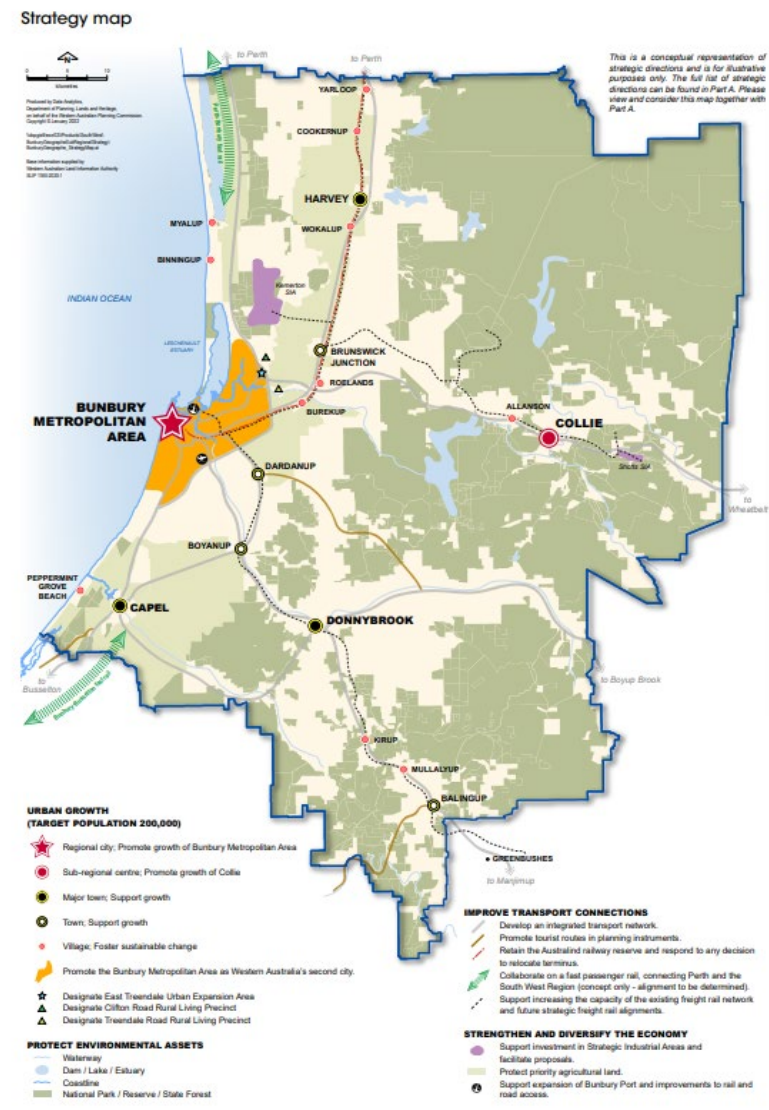
(2 case studies)



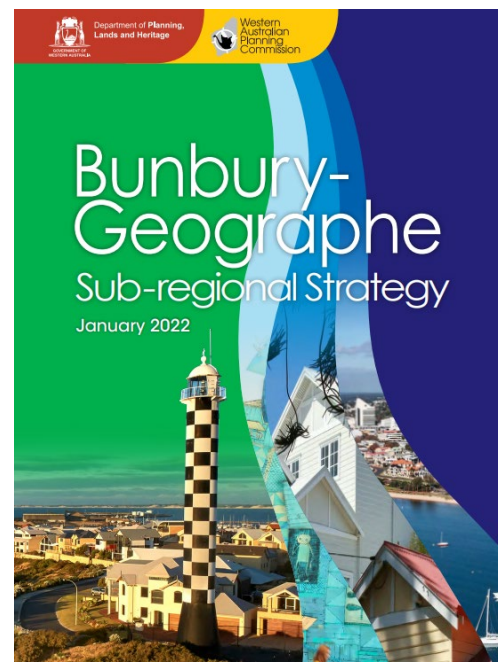
The Case Studies



Achieve a more consolidated urban form and development within the sub-region.



The Bunbury Metropolitan Area is Western Australia's second largest city and as the focus of major population and employment growth in the sub-region.



Case Study Application Areas

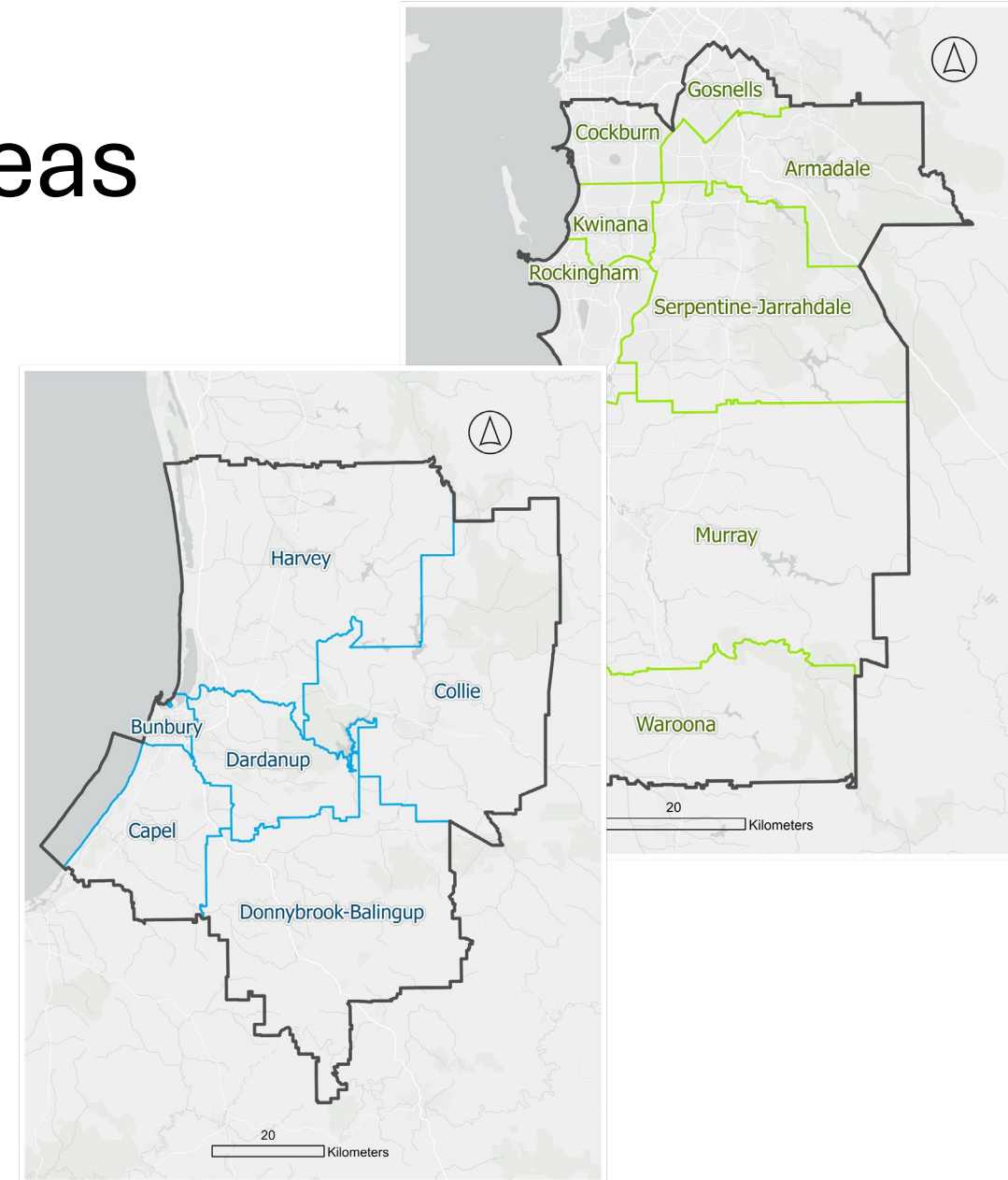
Two case study applications

- South Metropolitan Peel (9 LGA)
- Bunbury-Geographe (6 LGA)

How do we enable liveable and resilient communities?

The UNHaRMED process will be applied in both regions with local partners:

- Scenario Planning
- Assess future natural hazard risks
- Explore effectiveness of adaptation and mitigation

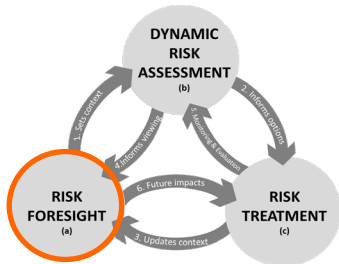


Case Study Workshops



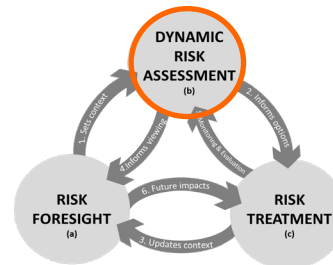
Scoping Workshop

- Develop narrative scenarios & define drivers
- Collect information on objectives / impact indicators
- Build understanding of UNHaRMED (informal training)



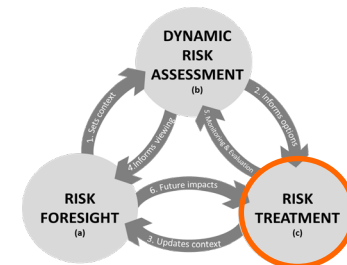
Risk Assessment Workshop

- Present results of UNHaRMED case study risk scenarios
- Design potential risk reduction options

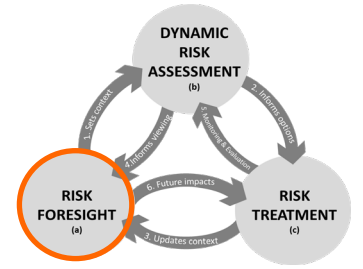


Risk Reduction Workshop

- Present results of risk reduction UNHaRMED scenarios
- Plan path forward to reduce future risk.



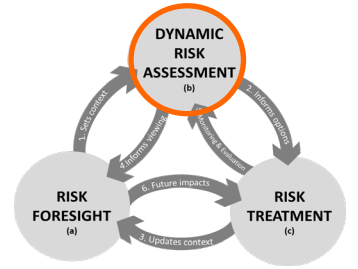
Risk Foresight: Scoping Workshops



- Held in June 2025. Representatives from LGAs, DFES, DWER, DPLH, DMTI, DPIRD, WALGA, MainRoads WA, Development commissions, NHRA and others!
- Defined critical uncertainties & drafted a set of future scenarios:

Bunbury Geographe	South Metropolitan Peel
Water, energy & resource security Governance Environment & conservation Jobs security and economic change Food security & agriculture Demographic & population change Social cohesion Residential land use change	Demographic change & urban dev. Water & agriculture Environment Jobs & economy Access to services & amenity Housing & transport Institutions & financing Social cohesion

Risk Assessment: Data Gathering



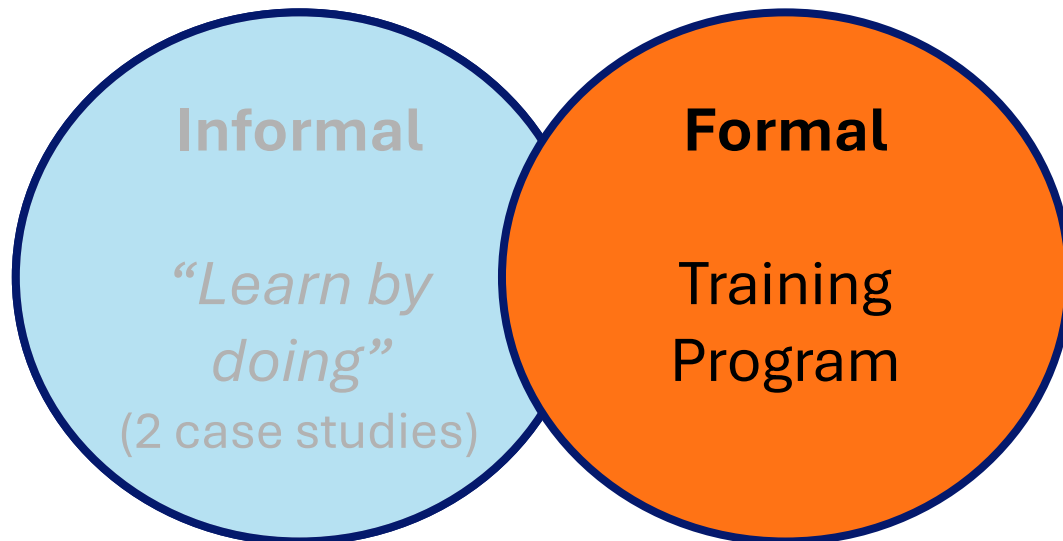
- Consolidating natural hazards data from across WA government agencies:

Agency	Data Provided
Dept. of Planning, Lands & Heritage (DPLH)	Exposure Information (Land use, building stock, population)
Dept. of Fire & Emergency Services (DFES)	Bushfire Data & modelling
Dept. of Water and Environmental Regulation (DWER)	Riverine Flood
Dept. of Transport & Major Infrastructure (DTMI)	Coastal Inundation Data

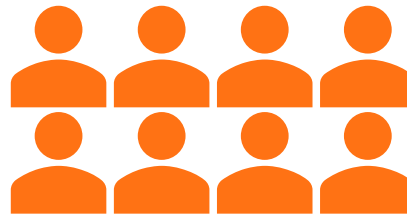
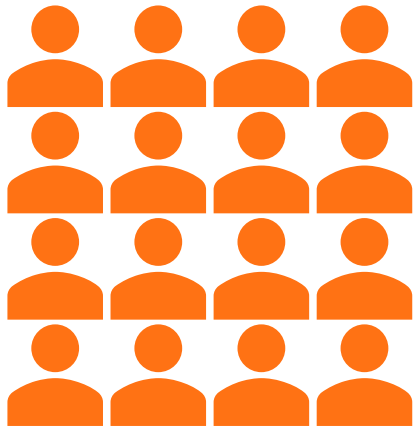
WA UNHaRMED Project with DPLH

Build capacity & understanding: For DPLH, SGA and LGA's. Using an inter-agency stakeholder approach.

Capacity Building Activities



Training Groups



Basic Users

- Use UNHaRMED software
- Basic understanding of uses and limitations
- Good understanding of natural hazard risk management
- Understand types of data
- Perform basic analysis of UNHaRMED results

Intermediate Users

Basic capabilities plus:

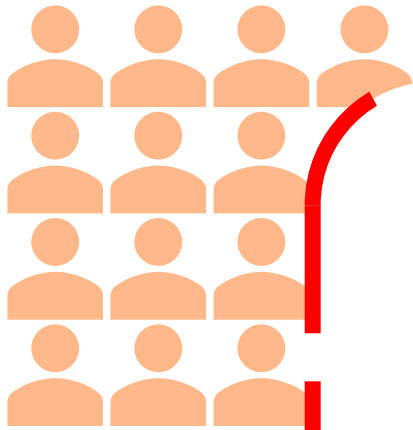
- Understanding of models within UNHaRMED
- Ability to set up and run integrated scenarios
- Analyse results from UNHaRMED in external map viewer
- Able to lead future workshops/studies with UNHaRMED

Advanced Users

Intermediate capabilities plus:

- Calibrate and test UNHaRMED applications
- Train new users without assistance
- Assumed detailed knowledge of geospatial data processing
- Able to provide technical support with future studies

Training Groups



Basic User

- Use UNHaRMED software
- Basic understanding of limitations
- Good understanding of hazard risk management
- Understand types of data
- Perform basic analysis of UNHaRMED results

DPLH will have tools and capacity to apply the UNHaRMED process across WA.

- Able to lead future workshops/studies with UNHaRMED

with future studies

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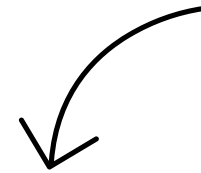
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Presentation Questions

*Get involved if you are
from WA!*



This project is building capacity and understanding within our agencies to act out the practice.

We hope to translate research into practice.

Through this project we aspire to help build resilient and liveable communities in the face of an uncertain future.



Thank you

The development and application of the UNHaRMED process is the product of the time, effort and contributions of many people across Australia, including within the different study areas to date: Western Australia, South Australia, Tasmania & Victoria.

We continue to see how this process may translate from research and into the world of practice of disaster risk reduction



WA UNHaRMED Project with DPLH

Use Slido for Q&A



Slido.com | #ADRC25

Leave the project team feedback



DPLH