



Are Climate Related Disasters Still 'Black Swans', or Have They Become Our New Normal?

19 August 2025



THE UNIVERSITY OF
MELBOURNE

**Centre for
Disaster
Management
and Public
Safety**

Hosted by:

**The Centre for Disaster
Management and Public Safety,
The University of Melbourne**

and

Value Advisory Partners

The University of Melbourne acknowledges the Traditional Owners of the unceded land on which we work, learn and live: the Wurundjeri Woi-wurrung and Bunurong peoples (Burnley, Fishermans Bend, Parkville, Southbank and Werribee campuses), the Yorta Yorta Nation (Dookie and Shepparton campuses), and the Dja Dja Wurrung people (Creswick campus).

The University also acknowledges and is grateful to the Traditional Owners, Elders and Knowledge Holders of all Indigenous nations and clans who have been instrumental in our reconciliation journey.

We recognise the unique place held by Aboriginal and Torres Strait Islander peoples as the original owners and custodians of the lands and waterways across the Australian continent, with histories of continuous connection dating back more than 60,000 years. We also acknowledge their enduring cultural practices of caring for Country.

We pay respect to Elders past, present and future, and acknowledge the importance of Indigenous knowledge in the Academy. As a community of researchers, teachers, professional staff and students we are privileged to work and learn every day with Indigenous colleagues and partners.

Speakers



MODERATOR:



Sally Kuschel

*Assist Coordinator-
General, Strategy &
Resilience Policy
National Emergency
Management
Agency*



Alex Babanin

*Prof. & Director of
CDMPS
University of
Melbourne*

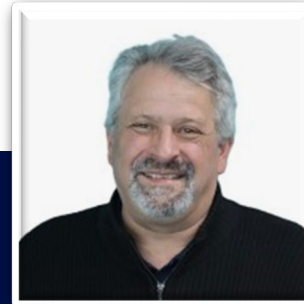


Jagannath Aryal

*A/Prof Dept of
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University of
Melbourne*



Sally Capp AO
*Vice-Chancellor's
Fellow
The University of
Melbourne*



John Marinopoulos
*Partner
Value Advisory
Partners*



Peter Heinmiller
*Principal
Value Advisory
Partners*



**Dr. Michael
Spencer**
*Adjunct Senior
Research Fellow
Monash Business
School Green Labs*



**Are climate disasters
still 'Black Swans' or
are they the new
normal?**



Copenhagen



Copenhagen



Singapore



Singapore



Paradise USA



Melbourne



Centre for Disaster Management and Public Safety, and spatial data for Australia

Centre for
Disaster
Management
and Public
Safety



THE UNIVERSITY OF
MELBOURNE

Prof. Alexander Babanin

Director, Centre for Disaster Management
and Public Safety

Assoc. Prof Jagannath Aryal

Dept of Infrastructure Engineering
The University of Melbourne

19 August 2025

12 Research Units



Geospatial and Location Intelligence

Studying global, continental, and local disaster related problems affecting society by utilising geospatial and location intelligence research capabilities.



Infrastructure Resilience

Advancing the field of disaster mitigation by fostering the scientific community's collaboration for critical technology.



Mental health and wellbeing interventions

Advancing the understanding and effective implementation of disaster-related mental health, wellbeing and recovery interventions and programs.



Coastal and Ocean Extremes

Using technology to predict coastal and ocean extremes to mitigate the impacts on human activity.



Community Resilience and Public Health

Building our understanding of the social impacts of disasters and the strategies for individual and community resilience and recovery.



Dynamic Hazards Mitigation

Supporting the mitigation of the dynamic hazards of earthquakes, collisions, landslides, rockfalls, wind-borne debris and hail.



Mission Critical Communications

Raising awareness and understanding of the importance of resilient, interoperable communications for the public safety market.



Transport and Logistics

Increasing the resilience of transport networks and enhance post-disaster humanitarian logistics practices by developing improved decision support systems



Unmanned Aircraft Systems

Developing novel and advanced applications of UAS technology in disaster management practice.



Early warning and forecasting of geohazards

Developing robust, community-centric early warning systems for geohazards, with a focus on landslides.



Earth Observations

Advancing the field of earth observation (EO) by leveraging the cutting-edge artificial intelligence (AI) for precise spatial information applicable to disaster mitigation.



Flood Management

Improving the accuracy of flood risk estimation for planning purposes, and our understanding of the factors that assist our ability to manage floods in real time.

Key Themes:
Hazards, People, Technology

Pillars:
Research, training, consulting

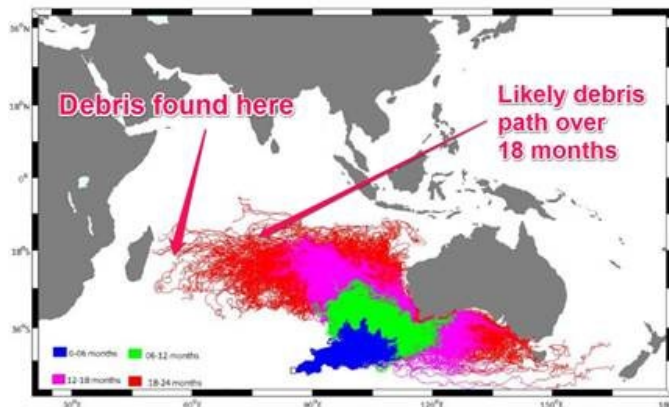
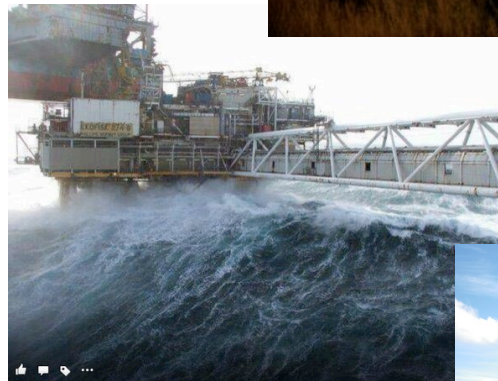
Expanding capabilities to governments and councils through our fellow University Centres, collaborations and partnerships



- **Multiple Centres at the University of Melbourne including the Centre for Cities**
- **Collaborations with multiple universities including Monash University, Deakin University, and multiple other Australian and International universities**
- **Collaborative Partnership Agreement with Value Advisory Partners for delivery**
- **Integrated State Government perspectives with Victorian Emergency Services and Treasury**
- **Collaborative data arrangements with multiple international data agencies bringing accessibility to data and information.**

THE UNIVERSITY OF
MELBOURNE

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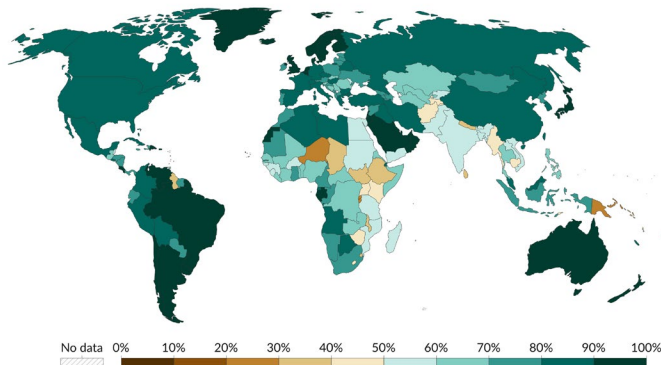
Earth Observation Theme: digital capabilities in transforming our access to data

Role of accurate data in smart city development

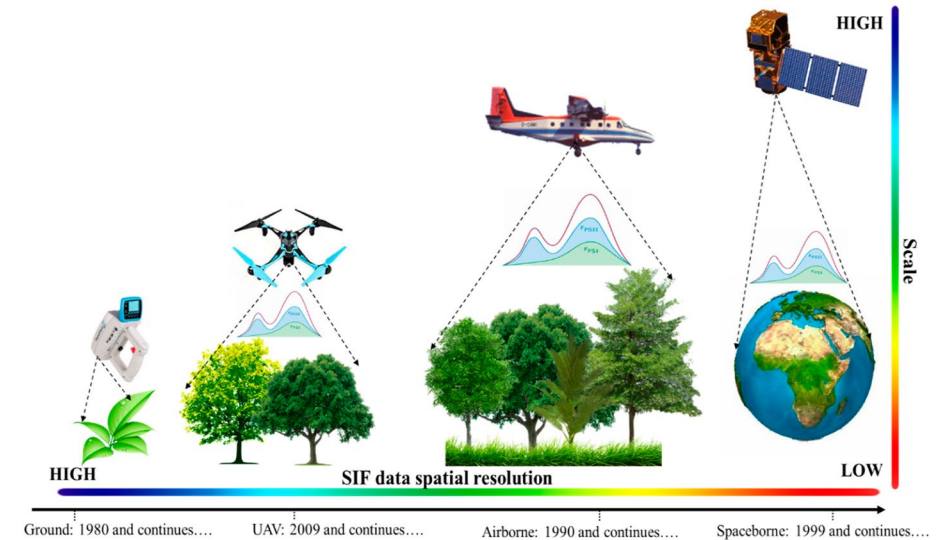
Share of the population living in urban areas, 2050

Share of the total population living in urban areas, given as estimates by HYDE until 2023 and UN projections through 2050, using the median fertility scenario for future urbanization trends.

Our World
in Data



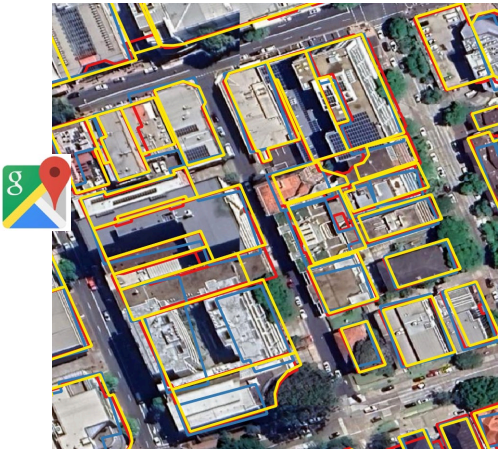
Ground, air, and space-borne data



Importance of accurate spatial data and models



Inaccurate data (buildings)



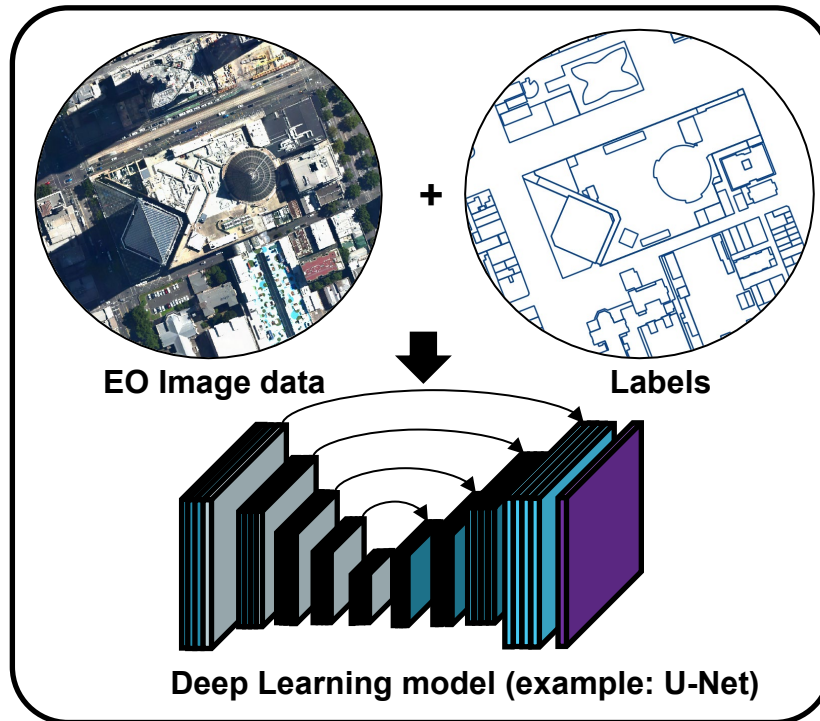
Community-derived data

AI-generated data

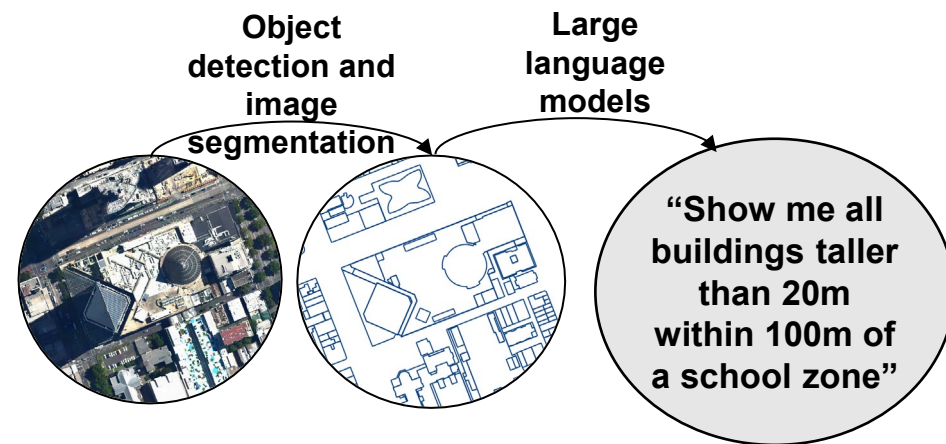
Commercial data

- **Urban Planning & Zoning**
 - Enables precise land use planning, infrastructure development, and zoning regulations based on actual built environments.
- **Disaster Management & Resilience**
 - Supports risk assessment for floods, earthquakes, fires, and other hazards by knowing exact building locations and dimensions.
- **Transportation & Mobility Planning**
 - Helps optimise road networks, public transport routes, and pedestrian pathways by understanding building density and distribution.
- **Environmental Monitoring**
 - Facilitates accurate modelling of urban heat islands, energy consumption, and carbon footprint based on real building geometry.
- **Smart City Applications**
 - Powers digital twins, AI models, and smart services (like utilities management and emergency response) that rely on precise geospatial data.

Digital capabilities and intelligent approaches for spatial data

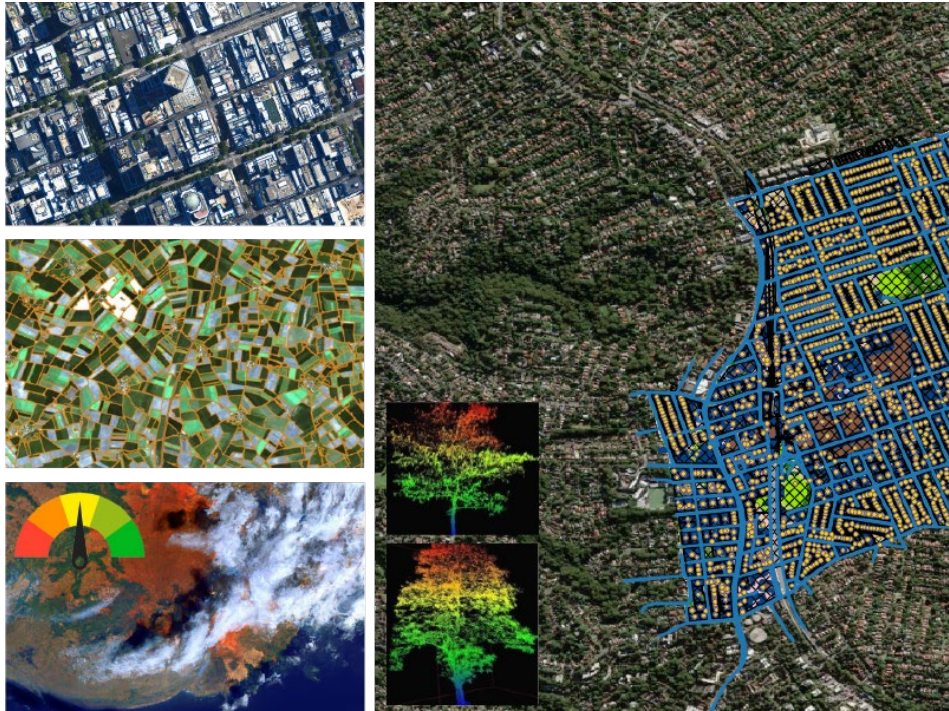


Computer vision and large language models

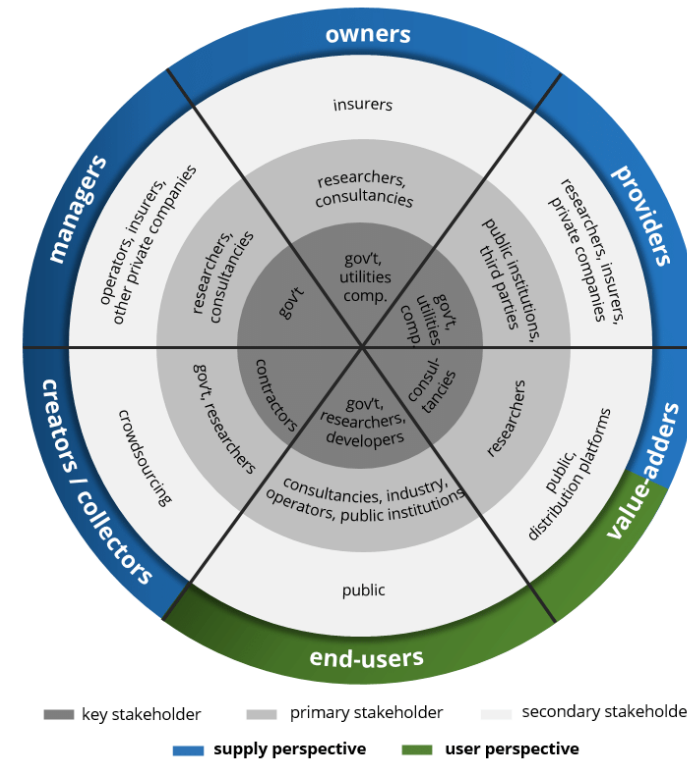


Building accessibility: The need of spatial data and information and importance of objects interaction

Spatial information



Geospatial and other stakeholders of
spatial information



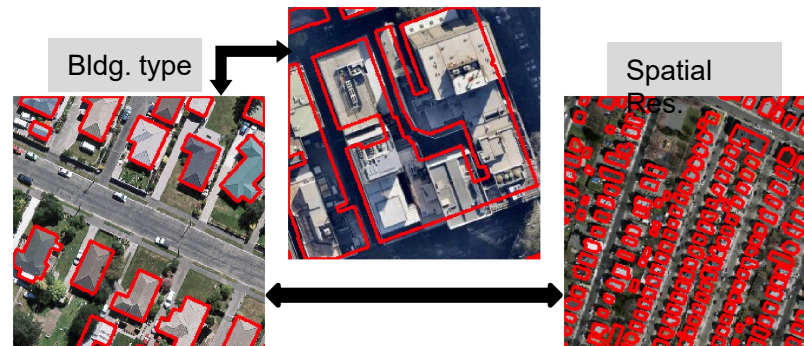
A case of urban building footprint inventory preparation

Focus: Three knowledge gaps identified through a systematic literature review

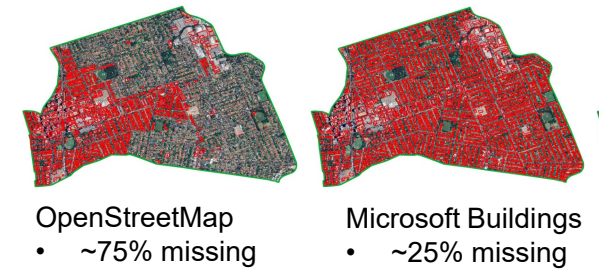
1. Label displacement error



2. Lack of cross-domain robustness



3. Incomplete data

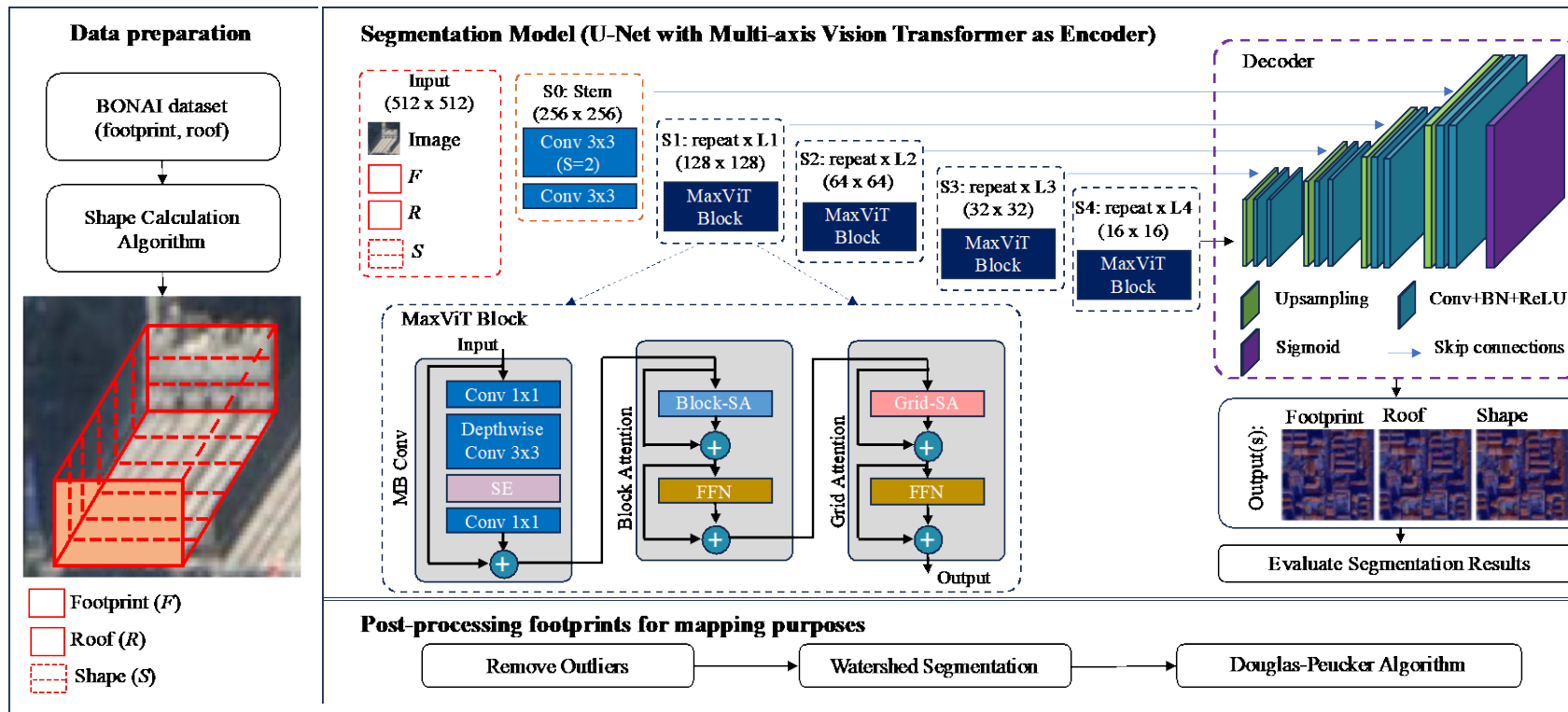


Example: Chatswood, Sydney
Data: 2023

Case studies with robust digital models

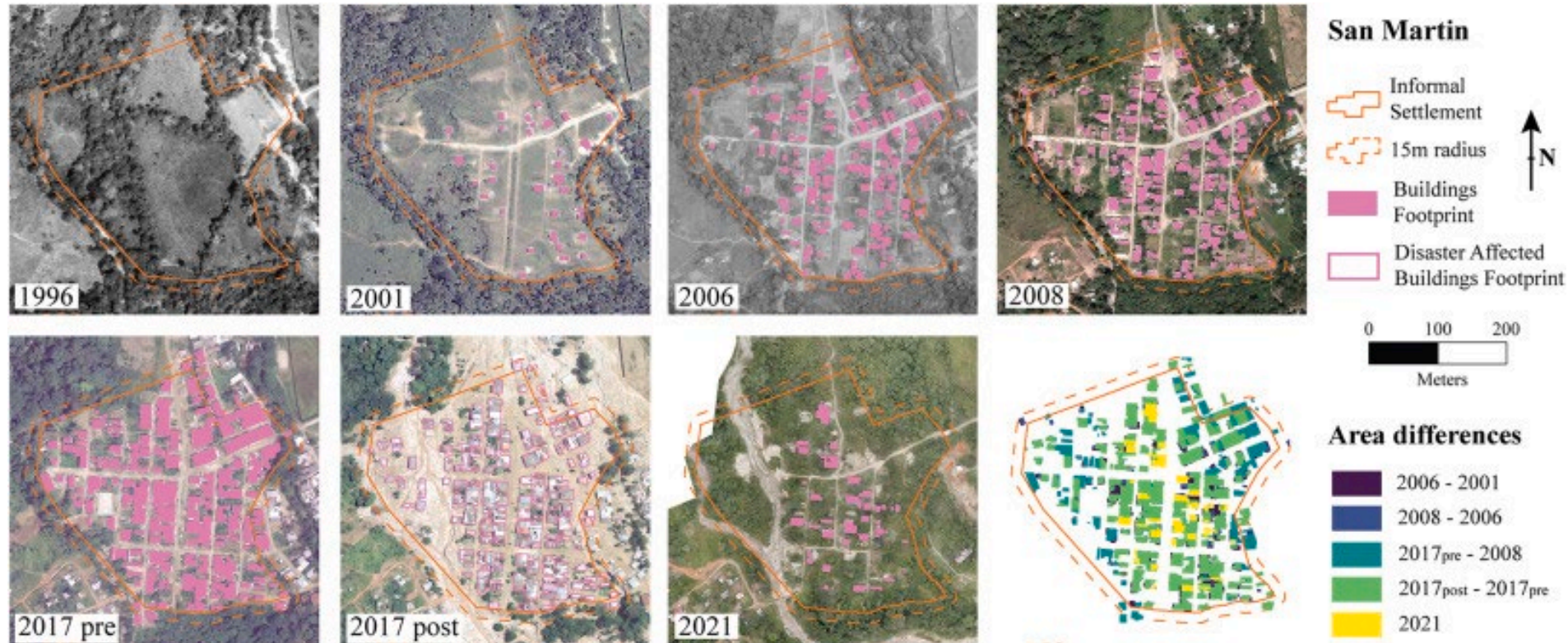
Accurate Building Footprint Data Extraction

Training model to learn roof, footprint, and its shape



Making historical data readily accessible: Case study from global south with digital models

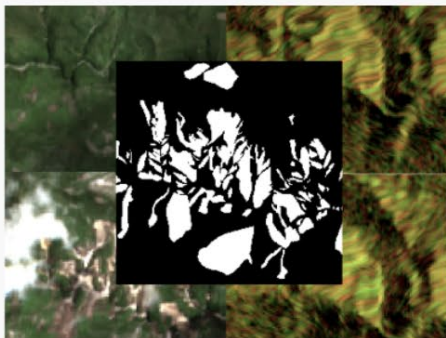
Informal settlement growth in disaster-prone cities



Datasets

Standard Dataset

Multimodal Remote Sensing Dataset for Landslide Change Detection in Haiti

★★★★★
No Ratings Yet

Citation Author(s):

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CHANUSSOT Jocelyn (Univ. Grenoble Alpes, Inria, CNRS, Grenoble INP, LJK)
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Submitted by:

Antoine Bralet

Last updated:

Sun, 07/14/2024 - 12:22

DOI:

10.21227/4heb-7h07

Data Format:

*.tif

1283 views

409 downloads

Categories:

Artificial Intelligence
Machine Learning
Image Fusion
Image Processing
Geoscience and Remote Sensing
Remote Sensing

Keywords:

Landslide; Remote Sensing; Deep Learning; Change
Detection; Multimodal

ACCESS DATASET

CITE

SHARE/EMBED

ABSTRACT

The detection of the collapse of landslides triggered by intense natural hazards, such as earthquakes and rainfall, allows rapid response to hazards which turned into disasters. The use of remote sensing imagery is mostly considered to cover wide areas and assess even more rapidly the threats. Yet, since optical images are sensitive to cloud coverage, their use is limited in case of emergency response. The proposed dataset is thus multimodal and targets the early detection of landslides following the disastrous earthquake which occurred in Haiti in 2021. It consists of SAR-optical pairs from Sentinel-1 and Sentinel-2 acquired shortly before and after the event. To encourage for machine and deep learning algorithms, the images are cropped into 1713 patches. Since Sentinel-1 SAR images are acquired both in ascending and descending passes, twice more patches are available in this modality. Due to the mountainous nature of the terrain, the images are provided together with a layover-shadow mask computed as described in [Meier *et al.*, 1993]. This mask is destined to

DATASET FILES

Pre_event.tar.gz (Size: 580.86 MB)

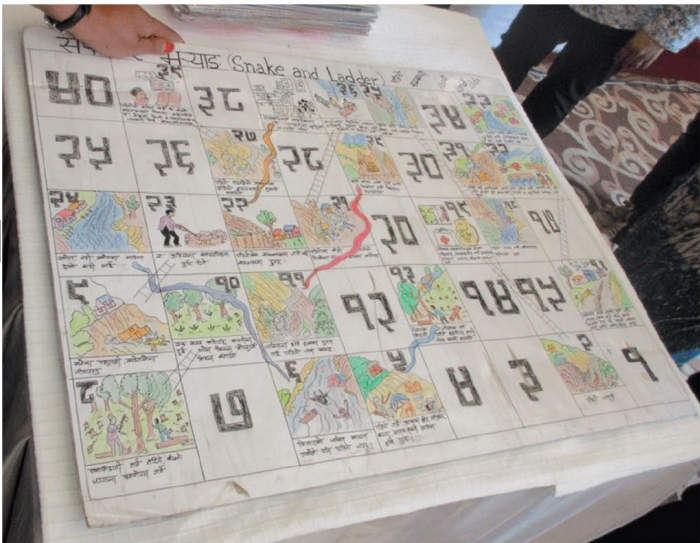
Post_event.tar.gz (Size: 588.08 MB)

Annotations.tar.gz (Size: 1.31 MB)

Geo-games community preparedness for pre- and post-disaster scenarios



Research from Iowa State University

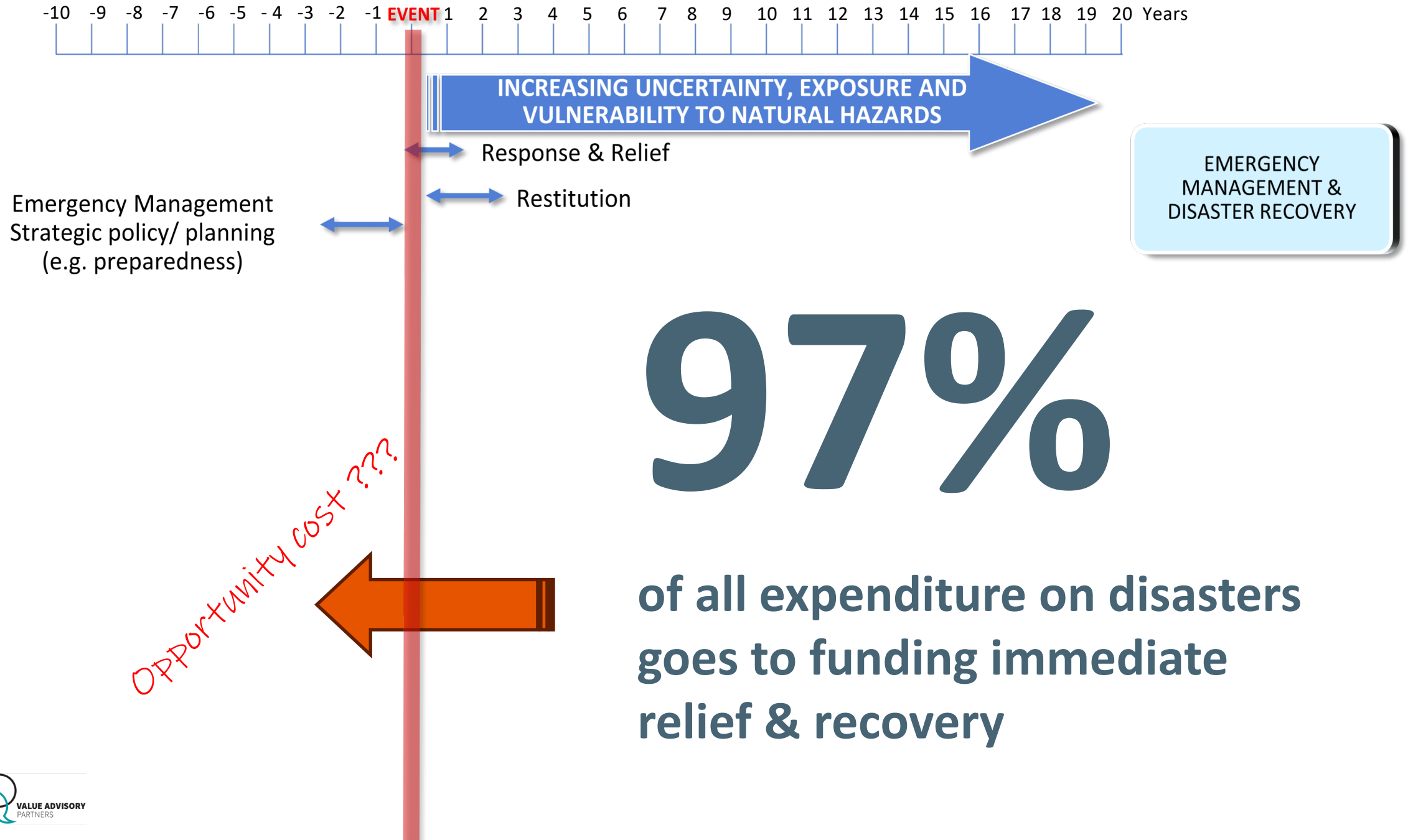


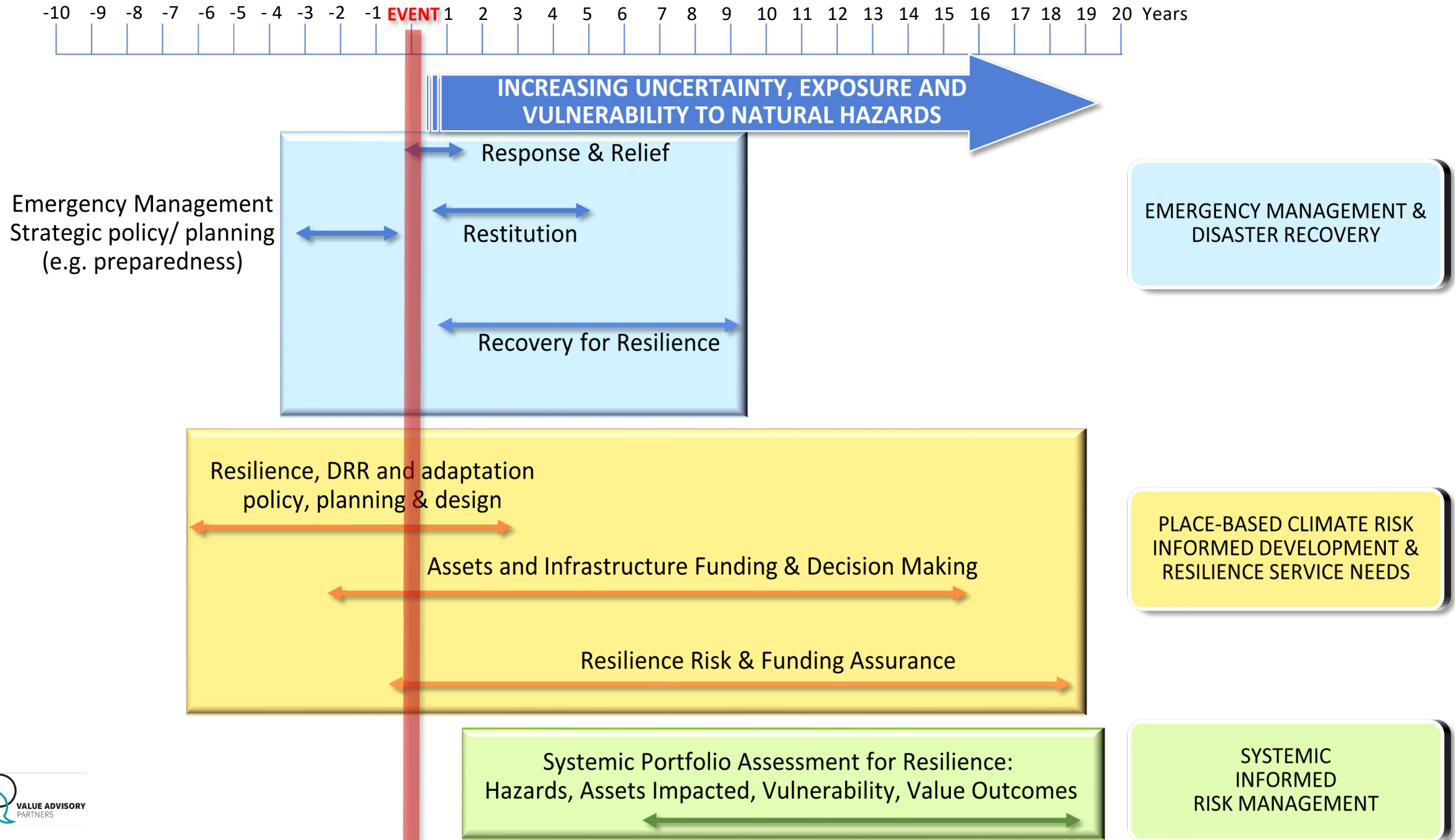
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VALUE ADVISORY
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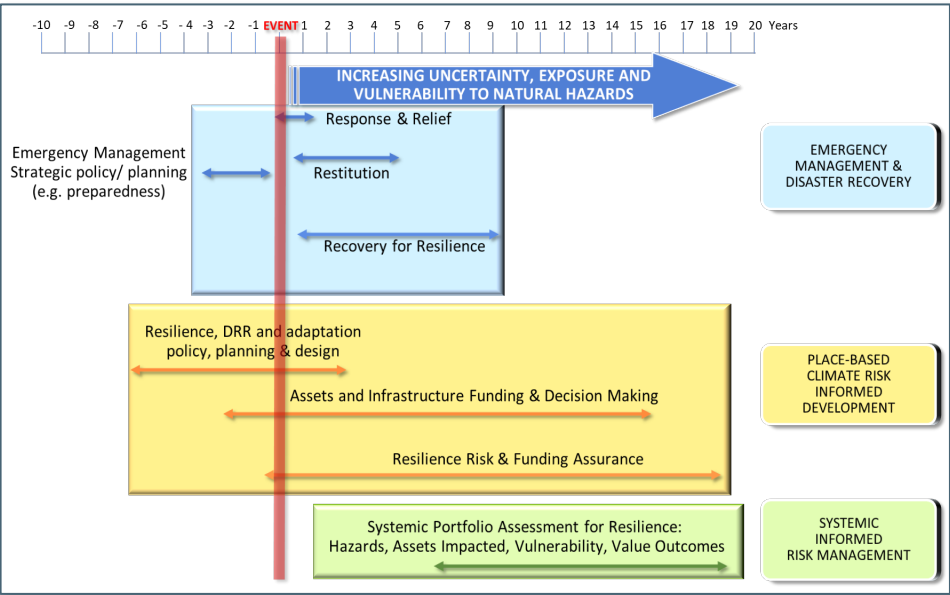


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Building an evidence base: understanding hazard risks, prioritising DRR options and connecting pathways to delivery



1

Evaluating the risk context

- Map assets in place to show interdependency of systems and infrastructure
- Community vulnerability and capacity to cope
- Overlay climate hazards to visualise risk and potential broader impacts

2

Assessing and prioritising the options

- Decision-support to integrate data, analytics, and climate scenarios for the resilience investment options
- Dynamic, real-time assessment of options, including prioritisation and bundling for potential funding and delivery

3

Connecting pathways to delivery

- Targeted assessment of options in a business case context
- Implications for risk, benefits, costs, and funding and delivery pathways
- Outcomes for communities and the economic, social and environmental conditions

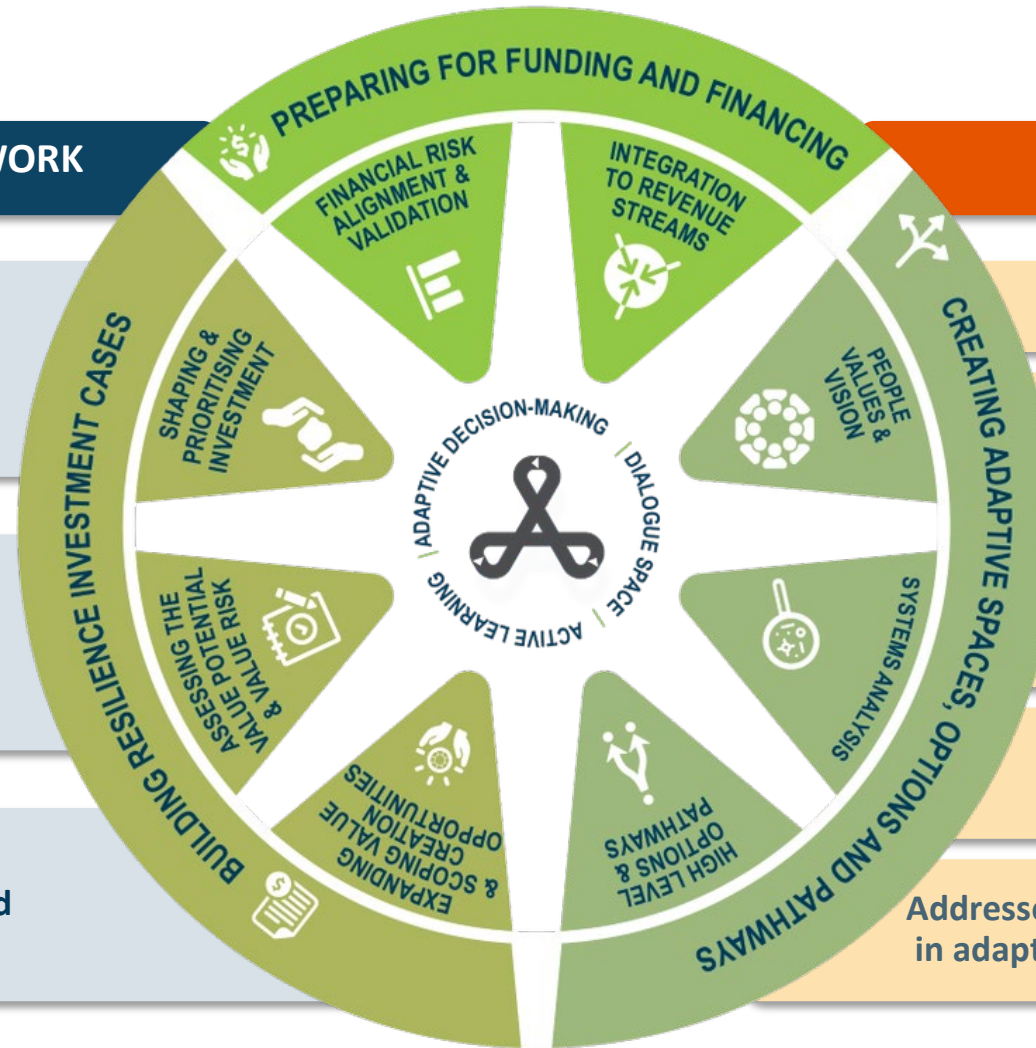
The Enabling Resilience Investment Framework

ATTRIBUTES OF THE ERI FRAMEWORK

Outlines the phases, modules, components, and processes required for disaster risk reduction

Enables the creation of adaptive spaces, options and pathways for increased capacity to cope with disasters

Helps create value for communities, build resilience investment cases, and prepare for funding and financing



BENEFITS OF THE ERI FRAMEWORK

Inclusive and systems-based framework providing quantifiable outcomes

Develops collaborative & coordinated partnerships

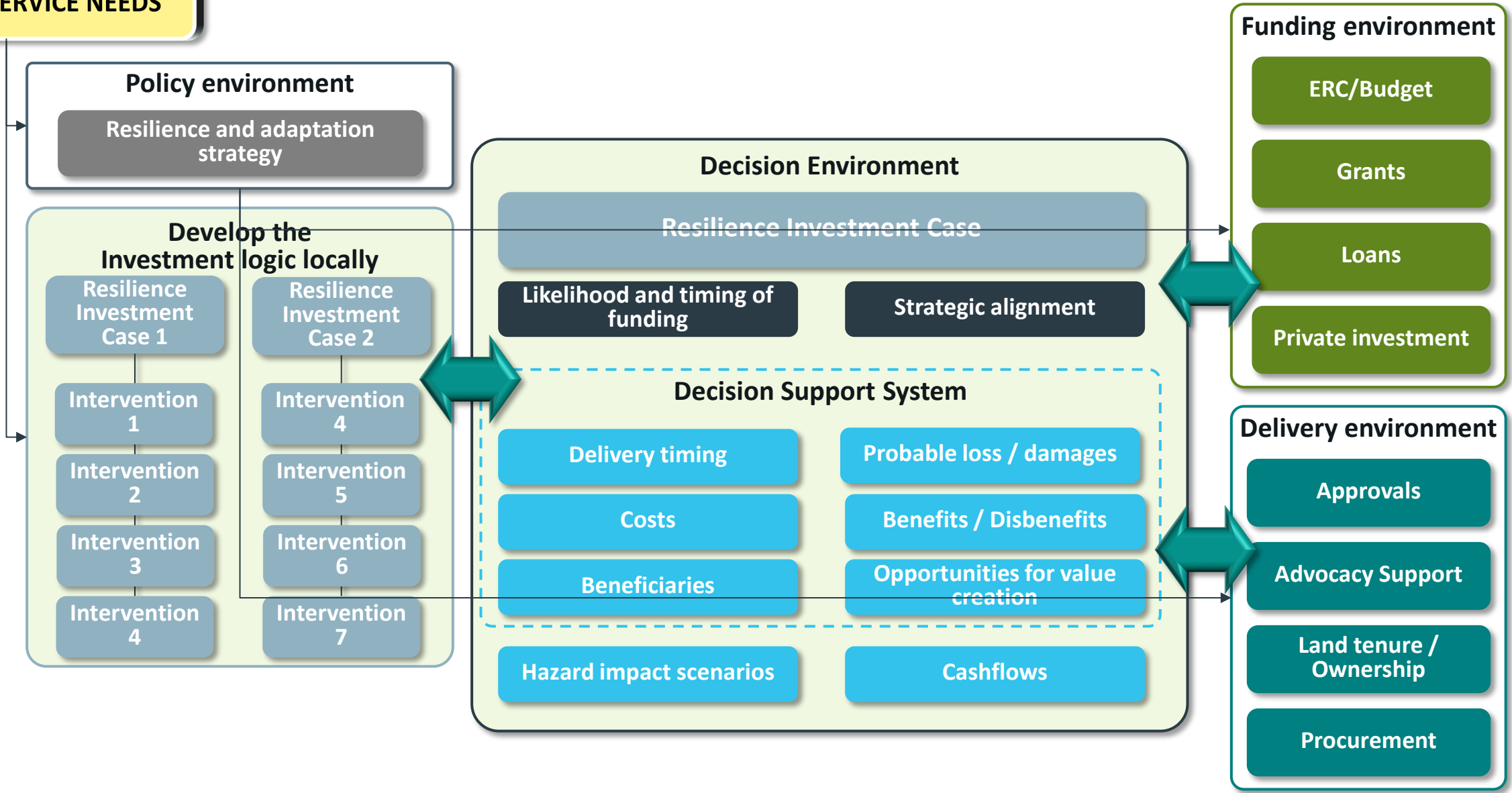
Assesses mitigated disaster & financial risk

Delivers enhanced community benefits & beneficiaries

New value creation & funding strategies to fund well-adapted and disaster-resilient futures

Addresses the economic assessment of investments in adaptation, disaster risk reduction and resilience

**PLACE-BASED CLIMATE RISK
INFORMED DEVELOPMENT &
RESILIENCE SERVICE NEEDS**



Outcomes from the ERI Project for Bega Valley Shire Council

Key Challenges	Transformative approaches for ERI	Project Outcomes
- Existing planning frameworks reactive, asset-focused, short-term, and don't adequately address climate risk - Input from broader stakeholders (internal and external) is constrained	ERI Co-design Process 	- Participatory workshops with 30+ council staff and external stakeholders built shared understanding of values, risk, and resilience objectives - ERI Manual & Rivermap: step-by-step adoption guide and visual journey supports ongoing ERI implementation and enhanced organizational capability
- Increased frequency and intensity of multiple hazards exposing systemic vulnerabilities - Limited internal processes to prioritise resilience and future-proof infrastructure investments	Resilience Investment Cases 	- Development of two case studies: Resilient Transport Corridors, and String of Sapphires Coastal Connectivity Clearer rationale for resilience intervention actions reflecting short- and long-term hazard risks addressing specific service needs
- Constrained funding, growing community expectations - Need for more objective and evidence-based way to evaluate costs and benefits, and prioritise asset investment	RICE Tool 	- Common framework for decision making allowing dynamic options assessment in real time - Facilitating bundling and sequencing of interventions into adaptable investment pathways and targeted funding proposals State funding secured for Cuttagee Bridge – one of the interventions in the Resilience Investment Cases

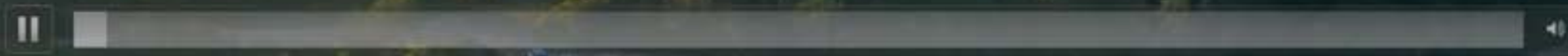
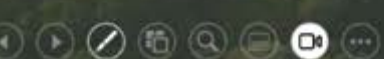
Click to see the video

ESOMAR AWARDS 2025

Enabling Resilience Investment in the Bega Valley

Best Use of Data Innovation

Video Footage taken from <https://www.pexels.com/videos/>
Accessed 8/07/25



Resilience and Disaster Risk Reduction Landscape

The Landscape provides for comprehensive solutions that integrate hazards, assets and infrastructure, community preparedness, strategic risk reduction and investment.

01.
Enhanced Infrastructure Resilience within climate change and scenarios

02.
Improving community preparedness for businesses, organisations, councils, and people

03.
Integration of Indigenous, Cultural and Environmental Considerations

04.
Improved hazard risk modelling, asset mapping & visualisation

05.
Reducing Disaster Risk through vulnerability & exposure assessments & interventions

06.
Increasing resilience in key systems during emergency response

07.
Strengthened Resilience Planning including options prioritisation and pathways

08.
Funding and Financing Pathways through integrated Dynamic Resilient Infrastructure optimisation

09.
Governance Structures & Delivery Models for Funding Resilient Infrastructure

Our Website: <https://www.valueadvisory.co/>
Contact us: info@valueadvisory.co



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Q & A

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