Flood Vulnerability and Mitigation Research

Dr Tariq Maqsood
Geoscience Australia
RMIT University
Ensuring Australia’s Community Safety:

- develops information on natural hazard risk pursuant to improved community resilience (reduced physical damage, financial loss, business disruption and social impact).
- Hazards: Flood, storm surge, earthquake, severe wind, tsunami, volcanic ash, bushfire
Post-Disaster Surveys
Post-Disaster Surveys

- Canberra Bushfires 2003
- South East Melbourne Flash Floods 2004
- Lismore Floods 2005
- Tropical Cyclone Larry 2006
- Victorian Bushfires 2009
- Padang Earthquake, Indonesia 2009
- Kalgoorlie Earthquake 2010
- Darfield Earthquake, NZ 2010
- Brisbane Floods (Indonesian and NZ assistance) 2011
- Tropical Cyclone Yasi (Philippines and NZ assistance) 2011
- Dungog Flash Floods 2015
- Tropical Cyclone Debbie 2017
Flood Damage

2011 Queensland
GA’s Flood Risk Research

- Vulnerability Curve (Stage-damage function)

Flood vulnerability curves for a single storey timber framed house
GA’s Flood Risk Research

- Residential Building Stock (Queensland)

FCM1  
FCM3  
FCM4  
FCM5  
FCM6  
FCM7  
FCM8  
FCM10
GA’s Flood Risk Research

- Residential, Commercial and Industrial Building Stock (Sydney)
GA’s Flood Risk Research

- Light Industrial Building Stock

Motor vehicle repair
Fabrication
Wholesale
Warehouse
Warehouse
Business park
GA’s Flood Risk Research

- Community Building Stock

Childcare

Community Hall

Aged care facility

Primary School
Flood Mitigation Project

Aim:

To provide an evidence base to inform decision making on mitigation of flood risk posed by vulnerable residential building stock.

Collaborators:

Geoscience Australia
RMIT University
Flood Mitigation Project

- Cost-Effective Mitigation Strategy Development for Flood Prone Buildings
Flood Mitigation Project

- Experimental testing
  - floor and wall tiles
  - Wall sheet bracings
  - Floor joists
Launceston Flood Risk Mitigation Project

- Flood Extent Maps
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• Flood Depth Maps
Launceston Flood Risk Mitigation Project

- Flood Depth Maps

![Flood Depth Maps](image_url)
Launceston Flood Risk Mitigation Project

- Vulnerability Models
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- Loss Estimation

<table>
<thead>
<tr>
<th>Tangible: Residential Sector</th>
<th>Tangible: Non-residential Sector</th>
<th>Intangible (Newstead)</th>
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<tbody>
<tr>
<td>Building repair/rebuild cost</td>
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<td>Physical health</td>
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<td>Contents damage cost</td>
<td>Clean-up cost</td>
<td>Mental health</td>
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<td>Loss of rental income</td>
<td>Loss of Inventory/equipment</td>
<td>Social Disruption</td>
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<tr>
<td>Clean-up cost</td>
<td>Loss of stock</td>
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<tr>
<td>Loss due to fatalities</td>
<td>Loss of income</td>
<td>Amenity and safety</td>
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</table>
Launceston Flood Risk Mitigation Project

- Estimated affected properties and population
- Estimated Average Annual Loss

<table>
<thead>
<tr>
<th>ARI (years)</th>
<th>Number of affected residential properties – Before Mitigation</th>
<th>Number of affected residential properties – After Mitigation</th>
<th>Number of Affected People – Before Mitigation</th>
<th>Number of Affected People – After Mitigation</th>
<th>Average Annual Loss Before Mitigation ($ M)</th>
<th>Average Annual Loss After Mitigation ($ M)</th>
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</table>
Launceston Flood Risk Mitigation Project

- Loss Exceedance Curves - Before and After Mitigation
Launceston Flood Risk Mitigation Project

- Cost Benefit Analysis

Project Life: 80 years

Actual Cost: $58.4 M (2016)

Estimated Cost: $22 M (2006) or $27.9 M (2016)

Discount Rates: 3% to 7%

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<tr>
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Research Agenda

• National Strategy for Disaster Resilience
  – Understanding risk.
  – Empowering individuals and communities to exercise choice and take responsibility.
  – Reducing risks in the built environment.
Any Questions?

Thank you