The mitigation exercise: A long term mitigation planning process, with a coastal flooding case study in Adelaide

Graeme Riddell / University of Adelaide
Ed Pikusa / Department for Environment & Water (SA)
David Parsons / Crisis Management Australia

@bnhcrc @bnhcrc
Team effort

- Ed Pikusa (DEW)
- David Parsons (CMA)
- Holger Maier (UoA)
- Hedwig van Delden (RIKS)
- Maggie Hine (City of PAE)
- Jonathon Jackson (City of PAE)
- Tony Kamenjarin
- Monique Blason (DPC)
- Brenton Keen (SAFECOM)
- Linda Haskins (SAFECOM)
- Murray Townsend (DEW)
- Liz Connell (SA SES)
- Desiree Beekharry (BNHCRD)
Exercise Forethought

UNHARMED Mitigation Exercise – Coastal flooding Port Adelaide, South Australia
Exercise Forethought

AIM:
- To gain a greater understanding of the current and future coastal flood risk in Port Adelaide.
- To explore coastal flood risk mitigation options for Port Adelaide.
- Provide basis for exploration of use of UNHaRMED in exercise setting
Exercise Forethought

Development and trial of a State mitigation exercise is proposed as a means of utilising UNHaRMED projections of population, climate and infrastructure growth towards strategic disaster mitigation planning.

Part 1 – a Discussion Exercise using a future scenario of amplified hazards and consequences, with an expanded list of observers involved in land use planning, infrastructure etc. The scenario was selected to be port Adelaide’s coastal flood risk.

Part 2 - (informed by Part 1) An analysis of decisions, actions and trends forecast to contribute to the increased hazard or consequence in the future, and examining what can be done now and in the near future to mitigate them.
UNHaRMED

A tool for pro-active disaster risk assessment and adaptation planning
Two driving principles
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
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.
Interactive modelling platform to assist decision making, investment choices and adaptation measures

Aims:
- Improve thinking about risk into the future;
- Better manage and minimise risk;
- Position organisations to best achieve this and lobby others.

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

Integrated scenario analysis

Multi-hazard

Incorporated assessment of adaptation measures (structural, land use planning, building vulnerability)

UNHαRMED
A tool for pro-active disaster risk assessment and adaptation planning
Part 1
Objectives

Increase our understanding of the conditions that contribute to the current and future likelihood of coastal flooding in Port Adelaide.

Increase our knowledge of the current and future consequences of coastal flooding in Port Adelaide.

Commence exploring risk mitigation options for future coastal flood risk scenarios.
Coastal Risk

Current natural hazard risk

- Coastal flooding
- Socio-economic factors
- Building condition
- Demographics

Natural Hazard Risk

Hazard

Exposure

Current risk

Riskier future

- Population
- Built assets
- Ecosystem Services
- Economic productivity

Climate change

Subsidence

Population growth

Urban development

Economic development

Future increasing risks

- Poor construction
- Increased inequality
- Compounding impacts

Vulnerability
Coastal risk

Current natural hazard risk

- Coastal flooding
- Socio-economic factors
- Building condition
- Demographics
- Population
- Built assets
- Ecosystem services
- Economic productivity

Future decreasing risks

- Community education programs
- Improved building standards
- Business continuity plans
- Land use planning
- Planned retreat
- Evacuation route planning

Less risky future
The day

1. Challenge understanding
   • Current and future population of at risk area?
   • How much has sea-level already risen in last 20 years?
   • What sits in your house below 800mm?

2. Introduce background and context
   • The area, it’s people, economy, culture (Councils)
   • What causes coastal flooding (BOM)
   • Historical events (Coastal Protection Board & State Heritage Office)
   • 2016 Flood – implications: response, relief and recovery

3. Current degree of flooding and its impacts
   • Hazard layers, current exposure
   • Risk – potential losses

4. Future scenario 1
   • Changing flood hazard, exposure and risk

5. Future scenario 2
   • Accelerated sea-level-rise
Current risks
Coastal flooding in Port Adelaide
Current hazard
Current exposure
## Current exposure

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<th>0.01m – 0.3m</th>
<th>0.3m – 1m</th>
<th>1m +</th>
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<tr>
<td>Population</td>
<td>1811</td>
<td>1628</td>
<td>28</td>
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<tr>
<td>Dwellings</td>
<td>887</td>
<td>784</td>
<td>17</td>
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<tr>
<td>Residential Property Value ($)</td>
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<td>$219,970,000</td>
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<td>6</td>
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</table>
Current risk

Damage

$8 – 14m
Future risks

Coastal flooding in Port Adelaide
Future flooding

Adelaide faces sea-level catastrophe

BRAD CROUCH, Sunday Mail (SA)
October 15, 2006 12:00am

AN apocalyptic prophecy of an Australia under water begins with the first places to disappear in a catastrophic sea-level rise.

Source: IPCC Third Assessment Report, Climate Change 2001 Synthesis Figure 3-4
**Future hazard**

Subsidence in Port Adelaide – estimated* 2.1mm / year

From 2000 to 2050: **10.5cm subsidence**

* Gillman ranges between 2.1 and 10mm/year

Sea level rise by 2050*: **30cm**

Total: **40.5cm**

*Moderate rate of SLR
Future hazard

Subsidence in Port Adelaide – estimated* 2.1mm / year

From 2000 to 2050:
10.5cm subsidence

* Gillman ranges between 2.1 and 10mm/year

Sea level rise by 2050*:
30cm

Total: 40.5cm

*Moderate rate of SLR
Future risk

- Climate change
- Subsidence

- Population growth
- Urban development
- Economic development

- Poor construction
- Increased inequality
- Compounding impacts

Riskier future

Future increasing risks

Hazard

Exposure

Vulnerability
Future risks

GIF of risk change, LU exposure, AAL - looped
Future risks
### Future risks

<table>
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<tr>
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<th>2016</th>
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<th>2050 – climate change</th>
<th>2050 – total change</th>
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<td>Arterial Roads (km)</td>
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Future risk

Damage

$280 – 340 m
Discussion

Q1: Implications for response and recovery – would we be able to deal with it? How is it different to today?

Q2: How can we mitigate – what options could be tested? Positive, negatives? What other information do we need?
Feedback

Did you gain a greater understanding of the conditions that will contribute to the likelihood of coastal flooding in Port Adelaide now and in the future?  
Y: 26 / N: 2

Did you gain a greater understanding of the consequences of coastal flooding in Port Adelaide now and in the future?  
Y: 27 / N: 1

Did the exercise assist you in starting to explore coastal flood risk mitigation and resilience approaches?  
Y: 25 / N: 3

Did you gain a greater understanding of the potential for the UNHaRMED platform to assist agencies to predict the consequences from future disasters, and help to mitigate them?  
Y: 25 / N: 2
Part 2

September 18 in Adelaide

Dive in deeper to mitigation
What is possible?
Testing with UNHaRMED
Experts in design and implementation
Providing background context for the “now”, but also predictions as to population and impact from climate change helpful. Predictions as to impacts very useful.

The consequences extend a lot further than the affected area, will take a combined effort to recover.

The elephant in the room is how to deal with the politics. The technical side is simple in comparison.

The UNHaRMED model was very good and useful to try to quantify this (consequences) and make it tangible.
Future exposure

Population change

Adelaide - West, 2016-41

2016 Population
- High: 317,033
- Medium: 289,074
- Low: 256,300

Projected Population
- 2021
- 2026
- 2031
- 2036
- 2041
Future exposure

2050

2016
Future exposure

2050

2016
**Future risks**

Accelerated sea-level-rise

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**Heatwaves amplify near-record levels of ice melt in northern hemisphere**

Greenland's ice sheet shrank more in past month than in average year, experts warn

![Visitors walk among free-floating ice jammed into the Ilulissat Icefjord during unseasonably warm weather.](image)

**Jonathan Watts** Global environment editor

@jonathanwatts

Fri 2 Aug 2019 16.00 AEST

1,478
Future hazard

Subsidence in Port Adelaide – estimated* 2.1mm / year

From 2000 to 2050: **10.5cm subsidence**

* Gillman ranges between 2.1 and 10mm/year

Sea level rise by 2050*: **88cm**

Total: **98.5cm**

*Accelerated form 2100 projected values