Queensland cyclone 2009_4

Key Topics:

- emergency management [2]
- modelling [3]
- scenario analysis [4]

Using realistic disaster scenario analysis to understand natural hazard impacts and emergency management requirements [5]

Realistic disaster scenarios help emergency managers better understand disasters. They allow for visualisation of potential impacts before disasters happen, and enable proactive planning for these events. This project developed realistic disaster scenarios using catastrophic loss models so that vulnerable areas, utilities and assets within our major cities can be identified.

Project: detail Notabs

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Description

Realistic disaster scenarios help emergency managers better understand disasters. They allow for visualisation of potential impacts before disasters happen, and enable proactive planning for these events. This project developed realistic disaster scenarios using catastrophic loss models so that vulnerable areas, utilities and assets within our major cities can be identified.

The scenarios explored were a 6.0 magnitude earthquake under the Adelaide CBD, a number of different earthquakes under the Melbourne CBD and a category 4 cyclone in south east Queensland. While an earthquake of 6.0 magnitude may be considered unlikely by many, a 5.6 magnitude earthquake occurred in Adelaide in 1954. Fortunately, its epicentre was far from populated areas, however today this area is densely populated. The scenario modelling considered the impacts if the earthquake occurred at 2am and 2pm, as these times were expected to result in the highest casualties. It is predicted that an earthquake like this would result in a large number of homes being destroyed or unsuitable for occupation. For both time periods, casualties could be more than 300, with over 100 life-threatening injuries expected. Basic medical aid that could not be self-treated is estimated to be required for approximately 5,000 people.

For the Melbourne earthquake scenario, three different magnitudes were examined (5.5, 6.0 and 7.0). These are all considerably larger than earthquakes that have occurred in Melbourne, and do not lie on any known faults that are considered active. As with the Adelaide scenario, impacts were modelled based on a 2am and 2pm occurrence. Under all scenarios examined, damaged caused by shaking and liquefaction would render parts of Melbourne inaccessible for large extents of time and cause long term infrastructure damage. Immediate casualties would range from under 200 for a 5.5 magnitude occurring at 2am, to more than 8,500 for a 7.0 magnitude occurring at 2pm. Those with life threatening injuries would range from less than 100 to more than 4,500. Under the most severe scenario, basic medical aid that could not be self-treated is estimated to be required for approximately 100,000 people.

The south east Queensland cyclone scenario was modelled on the track taken by Severe Tropical Cyclone Dinah in 1967. In the modelled scenario, the cyclone remained offshore, but made its closest passage to the mainland near Harvey Bay, and then moved offshore as it moved south, but staying close to the coast until south of the New South Wales border. Approximately 50,000 buildings were simulated to experience moderate structural damage, which may lead to occupants needing to seek emergency shelter. A further 8,000 would suffer major structural damage, and in many instances will need to be completely rebuilt. Older homes would bear the brunt of this damage (70-90%) as they were constructed prior to any stringent wind resistant design requirements. As a result of the damage, 50,000 people would need alternate accommodation. The cost of the damages would run into the tens of billions of dollars.

Modelling plausible scenarios such as these quantifies the impacts on society, critical infrastructure, lifelines and buildings, along with the natural environment. This allows emergency managers to understand the implications for their agencies so they can better prepare for, or mitigate the impacts of, events that are beyond their experience.

Download:
Using Realistic Disaster Scenario Analysis - Andrew Gissing and Simon Opper [37]

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17 NOV 2017

New online - November 2017

[38]

08 FEB 2017

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[39]

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CYCLONE, ENGINEERING

[40]

26 OCT 2016

Journal publishes important research

[41]

14 SEP 2016

New online - September 2016

[42]

15 MAR 2016

New online - March 2016

[43]

04 MAR 2016

What if a large earthquake hit Adelaide?

EARTHQUAKE, MODELLING

[44]

29 FEB 2016

Magazine explores CRC research, case studies and technology

COMMUNITIES, LOCAL KNOWLEDGE

[45]

16 JUL 2015

Science direct in videos

COMMUNITIES, SCENARIO ANALYSIS

[46]

25 MAY 2015

Major award for CRC researcher

COMMUNITIES, RESILIENCE

[47]

29 OCT 2014

Newsletter 2 - fatalities and building losses

[48]

Publications

Year	Type	Citation
2019	Book Chapter	Krupar, III, R. [49] & Smith, D. J. [50] *Hurricane Risk* **1,** 199-214 (Springer, 2019). DOI [51] Google Scholar [52] BibTeX [53] EndNote XML [54]
2019	Conference Paper	Pikusa, E. [27] **The mitigation exercise: a long term mitigation planning process, with a coastal flooding case study in Adelaide** [55]. *AFAC19 powered by INTERSCHUTZ - Bushfire and Natural*
2019	Journal Article	Gissing, A. [18], Opper, S. [60], Tofa, M. [61], Coates, L. [62] & McAneney, J. [14] **Influence of road characteristics on flood fatalities in Australia** [63]. *Environmental Hazards* **18 ,** (2019). DOI [64] C
2017	Report	Koschatzky, V. [19], O'Brien, J. [68] & Somerville, P. [10] **Earthquake Scenario, Melbourne** [69]. (Bushfire and Natural Hazards CRC, 2017). Google Scholar [70] BibTeX [71] EndNote XML [72]
2017	Report	Loridan, T. [8] & Mason, M. S. [6] **Using realistic disaster scenario analysis to understand natural hazard impacts and emergency management requirements: annual project report 2016-17** [7
2017	Report	Krupar, III, R. [49] & Mason, M. S. [6] **A modified Severe Tropical Cyclone Marcia (2015) scenario: wind and storm tide hazards and impacts** [77]. (Bushfire and Natural Hazards CRC, 2017). Goo
2016	Conference Paper	Rumsewicz, M. [81] **Research proceedings from the 2016 Bushfire and Natural Hazards CRC and AFAC conference** [82]. *Bushfire and Natural Hazards CRC & AFAC annual conference 2016* (Bus
2016	Conference Paper	Krupar, III, R. [49] & Mason, M. S. [6] **Forecasting the impact of tropical cyclones using global numerical weather prediction ensemble forecasts: a Tropical Cyclone Marcia (2015) wind and ra**
2016	Conference Paper	Kloetzke, T. [90], Mason, M. S. [6] & Krupar, III, R. [49] **Evaluating topographic influences on the near-surface wind field of Tropical Cyclone Ita (2014) using WRF-ARW** [91]. *AFAC16* (Bushfire a
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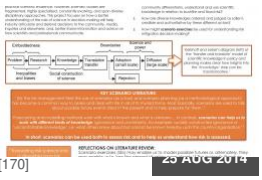
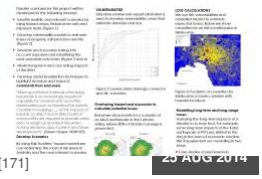


[170] 25 AUG 2014

Can we better understand how scientific knowledges work in risk mitigation through scenario exercises?

[170]

This project focuses on how a better understanding of the role of science in decision-making will help ...



[171] 25 AUG 2014

Using realistic disaster scenario analysis to understand natural hazard impacts and emergency management requirements

[171]

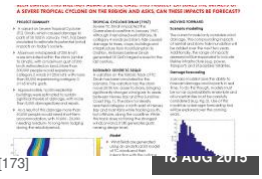
Realistic disaster scenarios help us better understand disasters.

[172] 25 AUG 2014

Disruption of critical infrastructure during prolonged natural disasters

[172]

The project aims to qualify and quantify the impacts of prolonged and multi-hazard natural hazard events on...



[173] 18 AUG 2015

Realistic Disaster Scenarios: Severe Tropical Cyclone SE QLD

[173]

CYCLONE [159], MODELLING [3]

What if a category 4 tropical cyclone impacted south east Queensland? What would the impacts be? Could our...

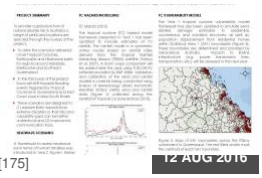
[174] 18 AUG 2015

A Mw 6.0 Adelaide Earthquake Scenario

[174]

EMERGENCY MANAGEMENT [2], MODELLING [3]

What-if a magnitude 6.0 earthquake happened near Adelaide SA? IN this project we have developed such scenario...



[175] 12 AUG 2016

Using realistic disaster scenario analysis to understand natural hazard impacts and emergency management requirements

[175]

INFRASTRUCTURE [176], RESILIENCE [177]

The study of historical occurrences of natural disasters only provides a very limited view of the full range...

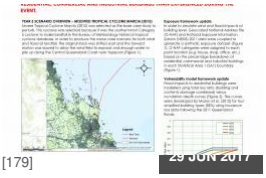
[178] 12 AUG 2016

Evaluating topographic influences on the near-surface wind field of Tropical Cyclone Ita (2014) using WRF-ARW

[178]

INFRASTRUCTURE [176], RESILIENCE [177]

This study utilises the advanced research version of the weather research and forecasting (WRF-ARW) model to...



29 JUN 2017

[179]

Realistic disaster scenario analysis: North QLD cyclone

[179]

EMERGENCY MANAGEMENT [2], MODELLING [3]

A modified severe Tropical Cyclone Marcia (2015) landfall event was generated. The modified case study...

Linked Projects

Mapping and understanding bushfire and natural hazard vulnerability and risks at the institutional scale
[180]

ECONOMICS AND STRATEGIC DECISIONS [181]

Prof Roger Jones
Victoria University [182]

[182]

Improved decision support for natural hazard risk reduction
[183]

ECONOMICS AND STRATEGIC DECISIONS [181]

Prof Holger Maier
University of Adelaide [184]

[184]

Cost-effective mitigation strategy for flood prone buildings
[185]

BUILT ENVIRONMENT [186]

Dr Ken Dale
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[187]

Improving the resilience of existing housing to severe wind events
[188]

BUILT ENVIRONMENT [186]

Prof John Ginger
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[189]

Natural hazard exposure information modelling framework
[190]

BUILT ENVIRONMENT [186]

Dr Krishna Nadimpalli
Geoscience Australia [187]

[187]

Cost-effective mitigation strategy for building related earthquake risk
[191]

BUILT ENVIRONMENT [186]

Prof Michael Griffith
University of Adelaide [184]

[184]

An analysis of building losses and human fatalities from natural disasters
[192]

SCENARIOS AND LOSS ANALYSIS [193]

Dr Katharine Haynes
University of Wollongong [17]

[17]

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