



bushfire&natural
HAZARDSCRC

USING REALISTIC DISASTER SCENARIO ANALYSIS

Understanding Impacts and Emergency
Management Requirements

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An Australian Government Initiative



MACQUARIE
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PROJECT TEAM MEMBERS

Researchers

- Dr. Matthew Mason
(co-leader, now at QUT)
- Dr. Katharine Haynes
- Dr. Lucinda Coates
- Prof. John McAneney
- Prof. Paul Somerville
- Dr. Ryan Crompton
- And many others...

End Users

- SES – NSW
- Office of Environment and Heritage
(OEH) – NSW
- Metropolitan Fire Brigade – VIC
- DFES – WA
- SAFECOM – SA
- RFS – NSW
- TFS – TAS
- Metropolitan Fire Service – SA

MOTIVATION

- Catastrophe loss (CAT-) models, used in insurance for pricing risk and capital requirements, are science-driven and produce large amounts of information
- Large events that happened in the past could be potentially catastrophic given expansions in population and infrastructure
- Knowledge of vulnerability specific to Australia is incomplete
- Potential far-reaching impacts of natural hazards are not well understood
- Stakeholders must consider that resources are limited when planning

ABOUT THE PROJECT

1) Develop realistic disaster scenarios

- a) Scenarios will focus on historical precedents and events with catastrophic consequences
 - Events in the range of 100-250 years return interval
 - E.g. 1989 M 5.6 Newcastle, 1954 M 5.4 Adelaide EQ and NSW great flood

- b) Research and development to extend CAT-models beyond \$ losses
 - Loss of essential facilities and infrastructure (hospitals, power, water)
 - Social and economic impacts
 - Regional to national impacts
 - Secondary perils (epidemic, induced industrial accidents, e.g. Christchurch earthquake sequence)

METHODOLOGY

- 1) Define a suite of scenarios based on
 - a) Expert opinion
 - b) End-user feedback
 - c) Exposure-hazard overlay (e.g. low-connectivity points in infrastructure network)
- 2) Hazard models developed by Risk Frontiers and other parties
 - a) e.g. Somerville and GA ground motion models for earthquake
- 3) Literature review of vulnerabilities for other parts of the world
 - a) E.g. HAZUS, GA
- 4) Adaptation to Australian experience
- 5) Exposure data
- 6) Case studies from historical record

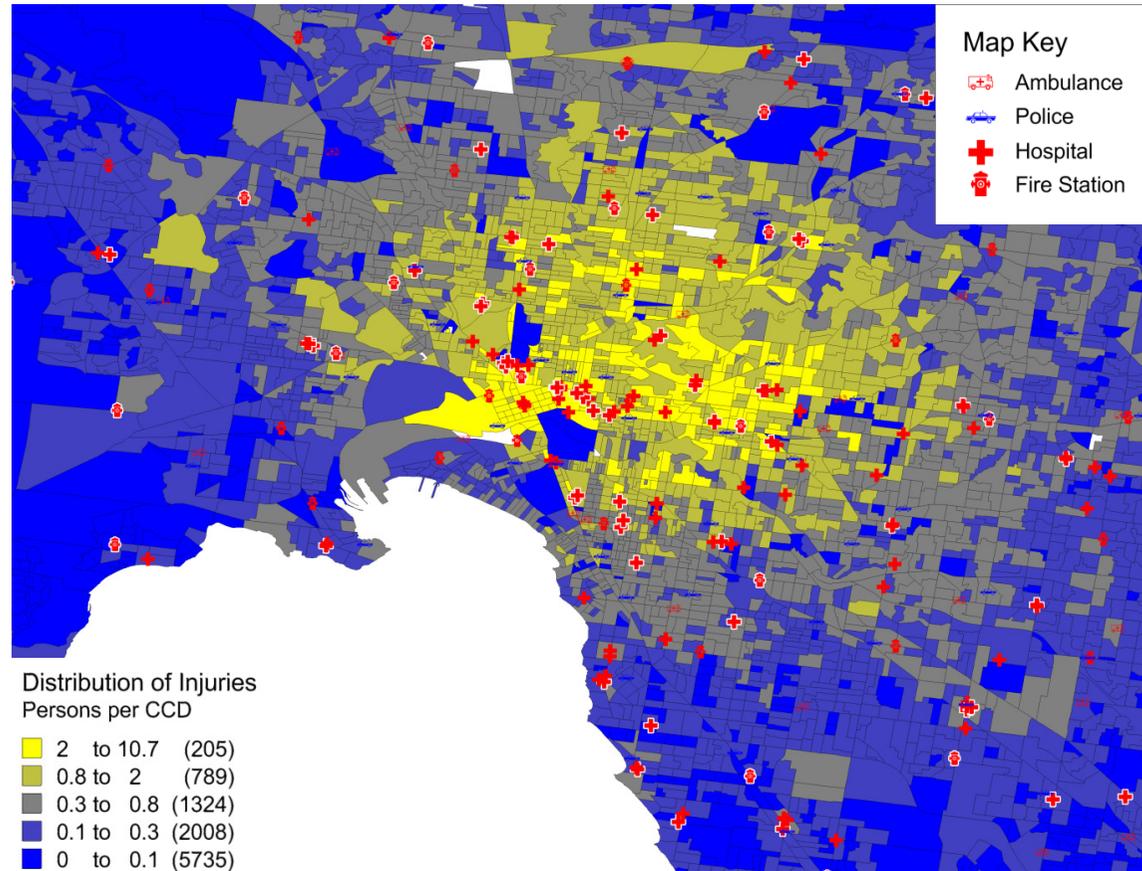
OUTPUTS

1) Scenario definition

- a) Location, magnitude, likelihood...

2) Damage maps and report

- a) People: estimated number of casualties
- b) Essential facilities (hospitals, schools): downtime, degree of damage
- c) Infrastructure: downtime, repair costs, location
- d) Properties damaged and level of damage
- e) Similar cases in the historical record
- f) Analysis of wider impacts (e.g. transport hubs)
- g) Analysis of social-economic impacts
- h) **End-user driven...**



EXAMPLE: MELBOURNE SCENARIO

Modelling of casualties due to a small earthquake in Melbourne (M5.5)

OTHER EXAMPLES

- 1) Earthquake in the Latrobe valley
 - a) Produces over 80% of Victoria's electrical power
 - b) One of the most seismically active regions in Australia

- 2) The Great Flood of 1954
 - a) Floods to all catchments of NSWs North coast
 - b) Since then, number of dwellings multiplied by 6

- 3) TC – wind event in Brisbane

- 4) What does a 250 year bushfire season look like?
 - a) More than 20 fires across Australia in a single week have been recorded historically
 - b) Large events in the 1800s