THE AUSTRALIAN NATURAL DISASTER RESILIENCE INDEX
A system for assessing the resilience of Australian communities to natural hazards
Project aim:
To develop an index that measures the current state of disaster resilience in Australian communities – the Australian Natural Disaster Resilience Index

Major output:
State of Disaster Resilience report
TODAY’S TALK

1) How we are approaching the assessment of disaster resilience in this project

2) Indicators of disaster resilience

3) First outputs – social character indicators
• The theory of disaster resilience is contested

• Resilience is here to stay. We are moving into a decades-long process of reflective application of resilience concepts

• Assessment of disaster resilience is one application of resilience concepts and requires a balance between theory and practice
- Resilience is the capacity of a community to cope with disturbances or changes and to maintain adaptive behaviour. (Bureau of Rural Sciences, 2008)

- The resilience approach identifies the resources and adaptive capacity that a community can utilise to overcome the problems that may result from change.
CONCEPTUAL MODEL FOR ASSESSING DISASTER RESILIENCE

Community resilience to natural hazards

- Coping capacity
- Adaptive capacity

The means by which people or organizations use available resources and abilities to face adverse consequences that could lead to a disaster (UNISDR 2004)

Factors influencing the ability to prepare for, absorb and recover from a natural hazard event

The process of adjustment to actual or expected [climate and its] effects in order to moderate harm or exploit beneficial opportunities (IPCC 2012)

Mechanisms that enable adjustment through learning, adaptation and transformation
CONCEPTUAL MODEL FOR ASSESSING DISASTER RESILIENCE

Community resilience to natural hazards

- Coping capacity
- Adaptive capacity

Exposure and risk

External drivers and linkages
We are assessing the potential for resilience

Assessing resilience at a national scale means we need the same variables across the whole of Australia
• Existing large scale data sets
• Proxies for many capacities
COPING CAPACITY

Social capital
Social and demographic factors that influence ability to prepare for and recover from natural hazard events

Education, Age, Employment, Gender, Household structure, Migration & mobility, English language proficiency

Economic capital
Infrastructure and planning
Emergency services
Community capital
Information and engagement
COPING CAPACITY

Social capital

Economic capital
Economic factors that influence ability to prepare for and recover from natural hazard events

Income equity, Remoteness, Home ownership, Single sector employment dependence, Growth rate, Transport

Infrastructure and planning

Emergency services

Community capital

Information and engagement
COPING CAPACITY

Social capital

Economic capital

Infrastructure and planning
  Preparation for natural hazard events using strategies of mitigation or planning

Emergency services

Community capital

Information and engagement

Dwelling type, Building codes, Municipal service levels, Land use planning policy
COPING CAPACITY

Social capital

Economic capital

Infrastructure and planning

Emergency services
The presence, capability and resourcing of emergency services, warning systems and disaster response plans

Community capital

Information and engagement

Access to health services, Emergency service size, structure and distribution, Emergency service volunteerism, Disaster response plans
COPING CAPACITY

Social capital

Economic capital

Infrastructure and planning

Emergency services

Community capital

The cohesion and connectedness of the community

Information and engagement

Length of residence, Recreation and leisure opportunities, Crime, Access to social services, Sense of community, Volunteerism, Well-being
COPING CAPACITY

- Social capital
- Economic capital
- Infrastructure and planning
- Emergency services
- Community capital
- Information and engagement

Availability of natural hazard information, community engagement and partnerships to encourage risk awareness

Risk awareness tools, Emergency service community engagement, Internet access
## ADAPTIVE CAPACITY

<table>
<thead>
<tr>
<th>Governance, policy and leadership</th>
<th>Organizational structure, Review and learning processes, Mission and culture, Partnerships, Research and development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational enablers of adaptation</td>
<td></td>
</tr>
<tr>
<td>Community and social capital</td>
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</tr>
</tbody>
</table>
ADAPTIVE CAPACITY

Governance, policy and leadership

Community and social capital
Social enablers of adaptation

Opportunity for social learning, Civic engagement, Social groups, Social capital

• Mechanisms enabling organizational and social change
• Differs from coping capacity because the focus is on learning and transformation as the way that change happens
INDEX CALCULATION

Indicators

Literature review
• Relationship between the indicator and disaster resilience – positive or negative
• Validation versus logic evidence

Statistical analysis
• Index calculation
• Indicator weighting
• Correlations among indicators
• Sensitivity analysis

Index
COPING CAPACITY

Social capital

Economic capital

Infrastructure and planning

Emergency services

Community capital

Information and engagement

Education, Age, Income, Employment, Gender, Household structure, Migration, English language proficiency
NEED FOR ASSISTANCE

% Population with a core activity need for assistance

Need help with self-care, mobility and communication because of disability, health condition or old age

Negative relationship to resilience – greater assistance = less coping capacity

SA2 level data, 2011 Census ASSNP
MIGRATION

% Households with one or more residents having a different address one year ago

Internal mobility
Residents new to that address (possibly also to the area)

Negative relationship to resilience – less familiarity with an area = lower coping capacity

Legend
% Total households with residents not present a year ago

SA2 level data, 2011 Census MV1D
% Households with one or more residents having a different address one year ago
Residents new to Australia

Negative relationship to resilience – less familiarity with Australian hazards and systems = lower coping capacity

% Population arrived in Australia after 2001

SA2 level data, 2011 Census YARRP
MIGRATION

% Population arrived in Australia after 2001
% Population aged over 75

Residents aged over 75

Negative relationship to resilience – being older = lower coping capacity

SA2 level data, 2011 Census

AGEP
% Population aged over 75

Legend
% Population aged over 75
0.00 - 3.12
3.12 - 6.28
6.28 - 9.78
9.78 - 13.77
13.77 - 17.80

EDUCATION

Ratio of population with high school education to post-secondary education

Educational attainment

? Negative relationship to resilience – less education = lower coping capacity

SA2 level data, 2011 Census

Legend

Ratio of certificate/postgrad to year 8-12

0.99 - 0.27
0.28 - 0.49
0.50 - 0.82
0.83 - 0.99
0.64 - 1.39

HEAP
## Example Index of Social Capital

<table>
<thead>
<tr>
<th></th>
<th>Total score</th>
<th>% population with need for assistance</th>
<th>% households not resident 1 year ago</th>
<th>% migrants arriving since 2001</th>
<th>% Population aged &gt;75</th>
<th>Educational attainment ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surry Hills</td>
<td>15</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cabramatta/Lansvale</td>
<td>19</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Armidale</td>
<td>16</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Ulladulla</td>
<td>15</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Categories based on percentiles (<25, 25-50, 50-75, 75-90, >90)
Categorized into a corresponding scale of 1 to 5, where 1 = low and 5 = high

Higher resilience  | Lower resilience

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Disaster Resilience

COPING CAPACITY
- Social character
- Economic capital
- Infrastructure and planning
- Emergency services
- Community capital
- Information and engagement

ADAPTIVE CAPACITY
- Governance, policy and leadership
- Community and social capital
PEOPLE

Phil Morley
Graham Marshall
Judith McNeill
Richard Stayner
Peter Hastings

Melissa Parsons
James McGregor
Ian Reeve
Martin Thoms
Sonya Glavac

Gwynne Brennan, CFA Vic
Sandra Barber, Fire Tas
Trent Curtin, Vic MFESB
Paul Fletcher, SA MFB
Colleen Ridge, SES Tas
Holly Foster, EM Vic
Chris Lewis, NSW FB

Karen Enbom, CFA Vic
Andrew Richards, NSW SES
Sunara Fernando, NSW RFS
Suellen Flint, DFES WA
Raelene Thompson, AEMI
John Richardson, Red Cross
Tamara Beckett, DEPI Vic
HOUSEHOLD STRUCTURE

% Households with children

Legend

% Households with children

0.00 - 15.10
15.11 - 26.71
26.72 - 36.36
36.37 - 46.80
46.81 - 100.00
HOUSEHOLD STRUCTURE

% Lone person households
HOUSEHOLD STRUCTURE

% Single parent households

Legend

% Single parent families

0.00 - 11.68
11.69 - 16.16
16.17 - 20.94
20.95 - 27.23
27.24 - 30.99
MIGRATION

% Population arrived in Australia after 2001

Legend

% Population arrived 2001 onwards

0.00 - 4.69
4.67 - 10.31
10.32 - 16.08
16.09 - 22.75
22.76 - 78.21
% Population arrived in Australia after 2001
ENGLISH LANGUAGE PROFICIENCY

Ratio of people who speak English well to not well or not at all

Legend
Prop Speaks English well/Not well or not at all
1.39 - 1.90
1.21 - 1.30
1.01 - 1.20
0.70 - 1.00
0.50 - 0.70
0.01 - 0.50
2.50 - 3.00
% Population aged below 15
% Labour force unemployed
% Population not in labour force

Legend
% Not in labour force:
- 0.0% - 19.24%
- 19.25% - 31.97%
- 31.98% - 42.18%
- 42.19% - 70.27%
- 70.28% - 100.00%