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 (ANDRI)

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

1) Conceptual boundaries for the assessment of disaster resilience

2) Progress on indicator themes

3) Designing the State of Disaster Resilience Report
The landscape of disaster resilience indicators in the USA

Susan L. Cutter

Abstract  The landscape of disaster resilience indicators is littered with wide range of tools, scorecards, indices that purport to measure disaster resilience in some manner. This paper examines the existing qualitative and quantitative approaches to resilience assessment in order to delineate common concepts and variables. Twenty seven different resilience assessment tools, indices, and scorecards were examined. Four different parameters were used to distinguish between them—focus on assets baseline conditions; spatial orientation (local to global); methodology (top down or bottom up); and domain area (characteristics to capacities). There is no dominant approach across these characteristics. In a more detailed procedure, fourteen empirically based case studies were examined that had actually implemented one of the aforementioned tools, indices, or scorecards to look for overlaps in both concepts measured and variables. The most common elements in all the assessment approaches can be divided into attributes and assets (economic, social, environmental, infrastructure) and capacities (social capital, community functions, connectivity, and planning). The greatest variable overlap in the case studies is with specific measures of social capital based on religious affiliation and civic organizations, and for health access (measured by the number of physicians). Based on this analysis a core set of attributes/assets, capacities, and proxy measures are presented as a path forward, recognizing that new data may be required to adequately measure many of the dimensions of community disaster resilience.

Keywords  Disaster resilience indicators - Measuring community resilience - USA

1 Introduction

While not a new concept, resilience has burst onto policy agendas in the last few years largely due to three interrelated events. First, a series of prominent disasters (Hurricanes Katrina and Sandy, as well as the Great Eastern Japan, Christchurch and Nepal...)
### General properties of disaster resilience assessment

<table>
<thead>
<tr>
<th>Assessment purpose</th>
<th>Properties of the Australian Natural Disaster Resilience Index (ANDRI)</th>
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<tr>
<td>Top-down or bottom-up assessment</td>
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## Paper - Conceptual Boundaries of the Index

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<td>End-user operability</td>
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COPING AND ADAPTIVE CAPACITIES

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 arrangements and processes that enable adjustment through learning, adaptation and transformation

The facilitation of adaptation by governance, institutional, management and social arrangements and processes.
Social capital
Social and demographic factors that influence ability to prepare for and recover from natural hazard events

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

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

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

Community capital
The cohesion and connectedness of the community

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

Governance, policy and leadership
Organizational enablers of learning, adaptation and transformation

Community and social engagement
Social enablers of learning, adaptation and transformation
DATA COLLECTION

Social capital

Economic capital

Infrastructure and planning

Emergency services

Community capital

Information and engagement

Governance, policy and leadership

Community and social engagement

Education, Age, Income, Employment, Gender, Household structure, Migration, English language proficiency
DATA COLLECTION

Need to collect the full data set before index computation

- Social capital
- Economic capital
- Infrastructure and planning
- Emergency services
- Community capital
- Information and engagement
- Governance, policy and leadership
- Community and social engagement
TRANSFORMATION DETAILS

Reversed

Skewness:
- Power transform: 0.56
- Pre-transform skewness: 1.8
- Post-transform skewness: 0.0

Kurtosis:
- Power d-m: 0.81
- Pre-transform kurtosis: 4.9
- Post-transform kurtosis: 0.0

Outliers:
- Pre-transform outlier count: 83
- Post-transform outlier count: 19
**Transformation Details**

- **Unreversal**
- **Skewness:**
  - Power transform: 0.19
  - Pre-transform skewness: 18.0
  - Post-transform skewness: -0.0
- **Kurtosis:**
  - Power d-m: 0.59
  - Pre-transform kurtosis: 441.1
  - Post-transform kurtosis: 0.0
- **Outliers:**
  - Pre-transform outlier count: 88
  - Post-transform outlier count: 10
OVERVIEW OF THEMES

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

0 100
Completeness of data set

None
Data issues

Indicator dimensions
1) Immigration
2) Internal migration
3) Language proficiency
4) Need for assistance
5) Family composition
6) Household composition
7) Sex
8) Age
9) Education
10) Employment & Occupation
OVERVIEW OF THEMES

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

**Indicator dimensions**
1) Home and car ownership
2) Income
3) Employment
4) Economy

Completeness of data set

None

Data issues
OVERVIEW OF THEMES

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

Indicator dimensions
1) Dwelling type
2) Building codes
3) State and local emergency planning
4) Local land use planning for hazards

Completeness of data set

- Scoring system for assessing emergency and land use planning capacity

Data issues
OVERVIEW OF THEMES

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

**Indicator dimensions**
1) Health response workforce
2) Emergency response workforce
3) Remoteness

Completeness of data set

- Need regional numbers for:
  - Police, fire and ambulance personnel
  - SES/Fire Agency – staff & volunteers

Data issues
OVERVIEW OF THEMES

Community capital

The cohesion and connectedness of the community

Indicator dimensions
1) Household support
2) Access to services
3) Wellbeing
4) Unemployment
5) Volunteering
6) Place attachment
7) Crime and safety

Completeness of data set

- None

Data issues
OVERVIEW OF THEMES

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

Indicator dimensions
1) Community engagement and hazard education
2) Access to telecommunications

Completeness of data set

- Obtaining comparable information about community engagement variables across States

Data issues
OVERVIEW OF THEMES

Indicator dimensions
1) Institutional character
2) Policy and legislation
3) Research and development

Completeness of data set
- None

Data issues
OVERVIEW OF THEMES

Governance, policy and leadership

Organizational enablers of learning, adaptation and transformation

Joyeeta Gupta et al.
The adaptive capacity wheel. A method to assess the inherent characteristics of institutions to enable the adaptive capacity of society. *Environmental Science and Policy, 2010*

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Indicators</th>
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<td>Resource levels</td>
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<td>Capacity for institutional innovation</td>
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<td>Policy and legislation</td>
<td>Age of legislation and policy</td>
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<td>Uptake of resilience strategic directions</td>
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<td>Research and development</td>
<td>Expenditure on research and development</td>
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</tbody>
</table>
OVERVIEW OF THEMES

Community and social engagement

Social enablers of learning, adaptation and transformation

Indicator dimensions
1) Skills for learning
2) Social engagement

Completeness of data set

- Coverage of social engagement data in urban areas

Data issues
DESIGNING THE STATE OF DISASTER RESILIENCE REPORT

Perth – South East

Resilience Index

- 0.0-0.1
- 0.1-0.2
- 0.2-0.3
- 0.3-0.4
- 0.4-0.5
- 0.5-0.6
- 0.6-0.7
- 0.7-0.8
- 0.8-0.9
- 0.9-1.0

Map data ©2016 Google
PEOPLE

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Judith McNeill
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James McGregor
Ian Reeve
Martin Thoms
Sonya Glavac

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Tamara Beckett, DEPI Vic