The Role of Spatial Data in Understanding Climate Change Risk

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Bangkok, Thailand
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Measuring Risk

Hazard | Exposure | Vulnerability | Impact

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Outline

- Spatial Data - Exposure
- Post-Disaster
  - Bushfire and Flood
- Climate Change Risk
  - Sea-Level Rise and Coastal Inundation
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HAZARDS

Climate Change
Cyclones
Bushfire
Floods
Tsunami
Earthquake

Hazard Models
Event

National EXposure Information System

Engineering Economic Demographic Vulnerability Vulnerability Casualty

Risk/Impact Assessment

18th UNRCC-AP, Bangkok, Thailand, 26 October 2009
### SPATIAL
- Latitude
- Longitude
- Address
- Block Size
- Floor Area

### STRUCTURAL
- Building Type
- Roof Type
- Wall Type
- Floor Type
- Age (Year)
- Storeys/Height

### OTHERS
- People
- Income Group
- Replacement Value
- Contents Value

**Residential Exposure Requirements**

[Image of a residential area from an aerial view.]
Building Contents

Cost Factors
Reconstruction Value
Floor Area
Contents Value
Population Demographics

Building Type
(SH, SD, F0, F3, F4)

Household Income

Reconstruction Value

Contents Value

Population Demographics

08/07/2005
Business Exposure

Spatial Information
- Latitude
- Longitude
- Address
- Block Size
- Floor Area
  - Total
- Floor Height

Structure Details
- Roof Type
- Wall Type
- Structural System
- Façade
- Progressive Failure (Yes/No)
- Age
- Height/Number of Storeys
- Basement
Business Exposure

Business Information
  Usage (Commercial/Industrial)
  ANZSIC Category (Multiple Businesses)
    - Proportion
  Employees (Multiple Businesses)
  Customer Numbers
  Turn over
  Public Access (Full/Limited/Restricted)
  Tenancy

Value Estimations
  Replacement Value
  Contents Value
  Insurance Status
Infrastructure Exposure

Transportation
- Road Network
- Rail Network
- Bridges
- Tunnels
- Airports
- Ports

Water
- Storage & Treatment
- Urban Water Supply Network
- Sewerage Treatment Facilities
- Stormwater Drainage Systems

Energy
- Transmission Towers
- Electricity supply substations
- Gas compressor stations

Communications
- Communication Towers
- Telephone exchanges
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Disaster Damage Assessment
Sentinel Hotspots

Victorian Fires 2009

- Twice daily update of fire position from MODIS thermal satellite data
- Hotspots show the fire position at the time of satellite overpass
RAPID INVENTORY COLLECTION SYSTEM (RICS)

• Quick “first look” at damage impacts
• Complements detailed PDA field data collection
RICS – vehicle cabin setup
RICS – operational display
2009 Victorian Bushfires
2007 New South Wales Floods
<table>
<thead>
<tr>
<th>Category</th>
<th>Storms</th>
<th>Floods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Buildings</td>
<td>69,627</td>
<td>1362</td>
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<tr>
<td>Residences</td>
<td>98,227</td>
<td>2496</td>
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<tr>
<td>Separate Houses</td>
<td>57,408</td>
<td>685</td>
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<td>Semi-detached houses</td>
<td>8,819</td>
<td>632</td>
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<td>Apartment Buildings</td>
<td>3,400</td>
<td>45</td>
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<tr>
<td>People</td>
<td>216,566</td>
<td>3802</td>
</tr>
</tbody>
</table>
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Coastal Climate Change Risk
Coastal Inundation

- Sea-level rise
- Tides
- 1 in 100 year storm surge
High Water Surface + Storm Surge
SmartLine: Geomorphic and Stability Mapping of Shoreline
Comparison of Inundation Levels
Lidar vs SRTM 3-sec
Comparison between corrected SPOT and LiDAR DEMs
Future Coastlines Modelled
Combined Climate Change Impact
In Closing

• Spatial data is essential to understanding climate change risk.
• Risk = hazard x vulnerability x EXPOSURE
• Other vital data includes:
  – Digital Elevation Models
  – Coastal geomorphology
  – Post-disaster casualties, damage and loss
• Provides basis for informed decision making to reduce risk and adapt to climate change
• Spatial/mapping agencies have a vital role
Thank You

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