Adapting to climate change: development of an integrated decision support tool for disaster and evacuation planning in regional areas

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Overview content

- Climate change exacerbating extreme weather events
  - for which evacuations may be needed
  - floods, cyclones and bush fires

- Road network planning
  - limited consideration of evacuation needs in past practice
  - importance of community behavioural response
  - critical locations – network vulnerability analysis

- A conceptual decision support system
  - for scenario planning
  - system specification and design
Transport issues

- Urban networks
  - complex networks (road or rail)
  - large numbers of evacuees
  - ‘pinch points’
  - need 2-way access
    - ... emergency services
  - short time frames ...
Transport issues

• Regional networks
  – narrow, low capacity roads
  – typically 2L2W, restricted SD
  – sparse, few alternative routes
  – vulnerable
  – separated settlements
    • … noting demographic change
A dilemma ...
New circumstances …
Framework of decision making process for emergency management

Derived from Sohn (2006)
Disaster impact model(s), e.g.
Flood
Storm
Cyclone
Earthquake
Tsunami
etc
…
Bushfire

Topography & physical environment
Road network
Land use distribution & intensity
Population demographics & spatial distribution

Impacts in space & time of disaster
Emergency alert/response plan
Traffic network model
Behavioural response model

Human/community impact assessment
Critical infrastructure assessment

Planning model: scenarios
Operational model: emergency situation

The Decision Support System

Vulnerability analysis

Critical infrastructure assessment

Traffic network model

Emergency alert/response plan

Impacts in space & time of disaster

Topography & physical environment

Road network

Land use distribution & intensity

Population demographics & spatial distribution

The Decision Support System
Model specifications – desired outputs

• Inform & assist strategic planning in a locality
  – in conjunction with local knowledge & available expertise
• Identify vulnerable locations, areas and routes
• Provide planning guidance for
  – evacuations of residents
  – access by emergency services
• Input to tools for property & location risk analysis
Model specifications

For a planning/scenario evaluation (transport) model

1. Simple enough, but giving reliable results & appropriate detail
2. Dynamic: update state of emergency and road access & traffic
3. Realistic measures of intersection, link & network capacity
4. Evaluate future land use plans & population distribution
5. Good representation of individual behaviour
6. Implement in dynamic GIS platform
7. Use as decision support in strategic planning