



Human society and risk: a focus on transportation and disaster

A perspective from Australia

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Content

- Disaster and evacuation planning in Australia
 - floods, fires and cyclones (typhoons)
- Vulnerability analysis
 - focus on regional areas
- Road safety audit
 - the general problem in society of road safety
 - helping the road user/consumer



Natural disasters in Australia

- Floods, *then* cyclones, *then* bushfires (in terms of \$)
- *But* bushfires, *then* cyclones, *then* floods (fatalities)
- Bushfire most difficult to manage
 - high speed of onset, restricted time for warnings
 - dynamic and 'unpredictable'
 - significant populations at risk
 - exurbia, peri-urban settlements
 - is evacuation feasible, and if so, when?

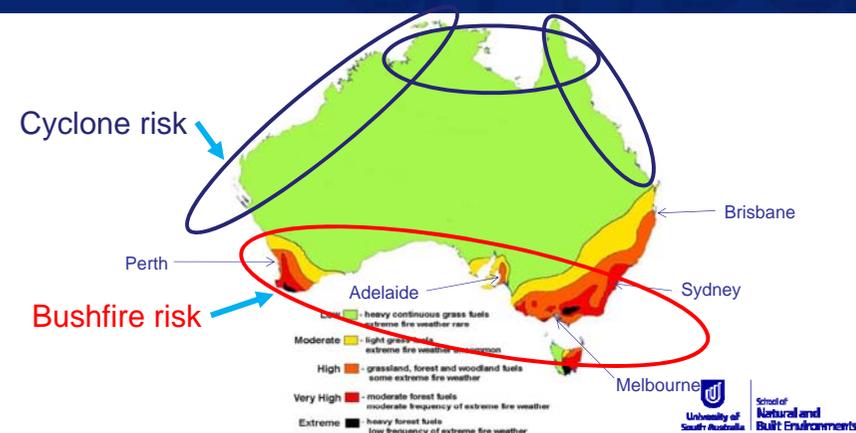


Changing circumstances

- Climate change
 - Australia: generally drier, but more severe weather events
- Demographic change
 - ageing population
 - population growth and migration to exurbia
 - thus increasing peri-urban populations
 - in areas of increasing fire risk
- Limited (road) infrastructure
 - 2 lane roads in difficult terrain

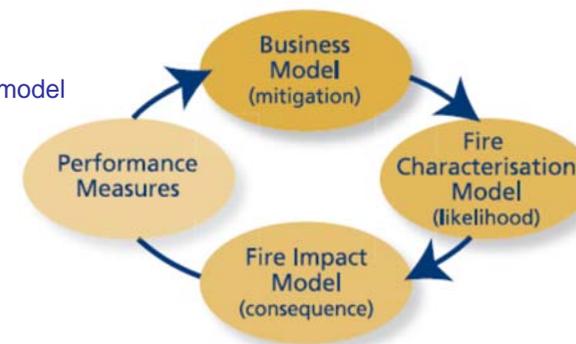


- Process model: *stay or go*
 - more precisely, ‘prepare, stay and defend; or go early’
 - worst place to be in fire is in the open (even in car)
 - last minute evacuation is lethal
- Fire services will not be able to cover all dwellings
- ‘Household action plans’, *prepared beforehand*
- If staying, must be fit, prepared and equipped
- ... evacuation not mandatory



- Consider
 - fire risk indices (*FDI*)
 - fire risk management model (e.g. *Phoenix*)
 - behavioural response model

- 3 main components
 - business model
 - fire characterisation model
 - fire impact model



[source: Tolhurst et al, 2008]



New circumstances

- Exceptional heatwave in SE Australia, 27 Jan – 7 Feb 2009
- Massive bushfires ravaged the state of Victoria on Saturday 7 February
- 'Off the scale'
 - *FDI exceeded all previously expected values!*



New circumstances: 'Black Saturday'

- Satellite imagery of fires
 - 3 pm Saturday 7 February



Source: BOM (2010), US MODIS Aqua satellite at about 04 UTC 09/02/07



New circumstances: 'Black Saturday'

- 173 people died
- Many towns & villages destroyed
- 113 of the dead had stayed at home
 - apparently prepared
 - warnings?
 - unprecedented ferocity



New circumstances: 'Black Saturday'

- Last minute evacuation?
- Consequences





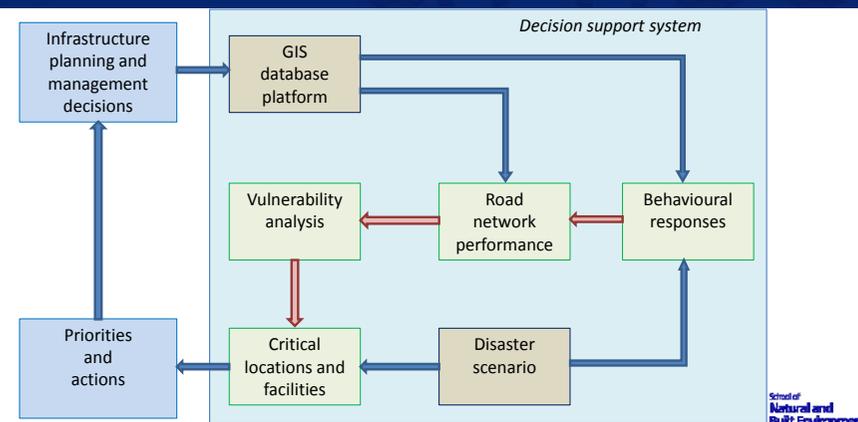
Disaster and evacuation planning

Recommendations of Royal Commission:

- Still 'stay or go', generally
 - but *safest way to survive is to be out of the area!*
- New warning level, 'Catastrophic' [... **just GO (beforehand)**]
- Better information on fire movements, for specific areas
 - *Tools to determine risk levels for properties and localities*
 - *Provide information about 'safe havens'*
 - *Advise residents about defensibility of their properties*
 - *Clear advice for planning of evacuations*



Emergency management framework

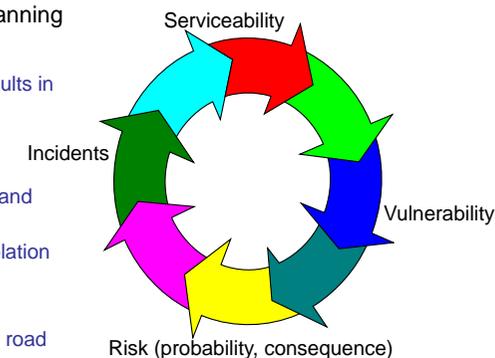


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Vulnerability analysis

- Emergency planning *and* regional planning
- Vulnerability:
 - the susceptibility to incidents that results in considerable reductions in network serviceability
- Different time frames
 - road closures, restricted movement, and delays (short term)
 - socio-economic consequences of isolation and separation (long term)
- Important for regional areas
 - characterised by 'sparse', low quality road networks

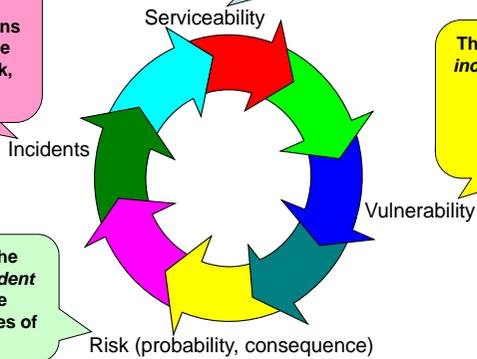


Events which directly or indirectly result in considerable reductions or interruptions in the serviceability of a link, route or network

The opportunity to use a link, route or network in a given time period

The susceptibility to incidents that results in considerable reductions in network serviceability

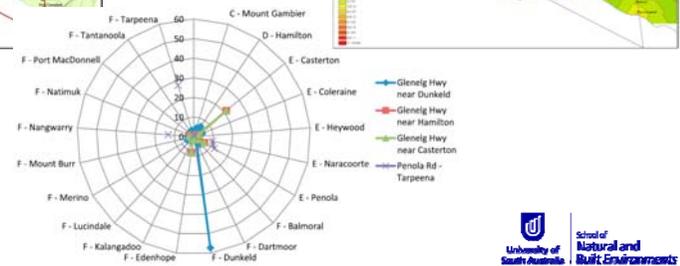
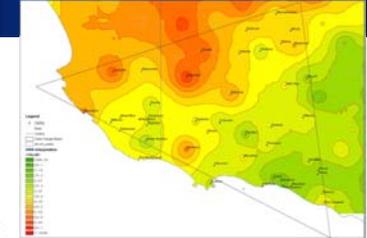
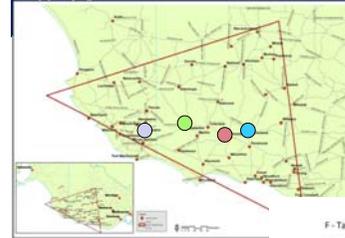
A composite of (1) the probability for an incident to occur and (2) the resulting consequences of its occurrence



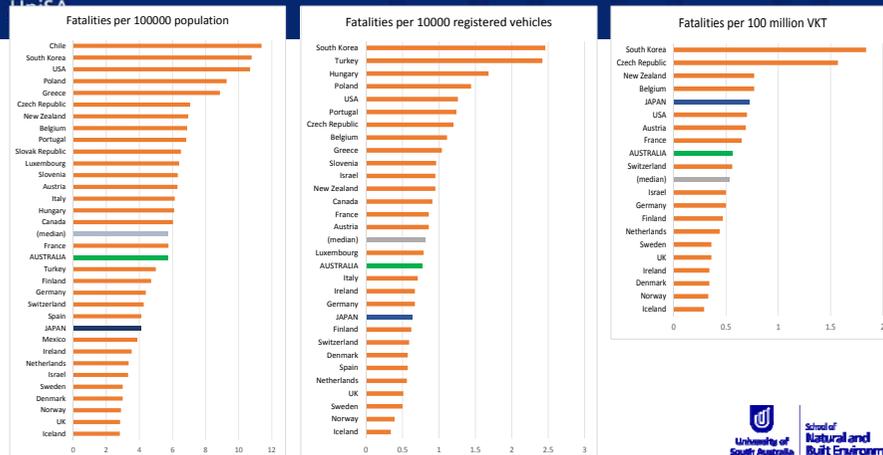
- Incidents include:
 - natural events (floods, landslides, ...)
 - road crashes
 - infrastructure failures



- Consequences can be:
 - short term (traffic operations)
 - long term (socio-economic impact)
 - localised (isolation)
 - wide area (regional economic impact)



- Road safety is a major issue for societies everywhere
- Road trauma is a major public health problem
- Its overall seriousness may exceed considerations of extreme events (disasters)



- Method used in modern road design and traffic engineering:
 - to assess the safety risk in a proposed design (or existing situation)
 - uncovers potential safety problems
 - and points to solutions
 - requires engineer take the perspective of the road user
 - how will ordinary people cope with the traffic situation?
 - investigates how the road environment may contribute to safety problems
 - consider location '24/7', i.e. under all conditions (day, night, fine, rain, ...)
 - avoid response of 'blame the victim'



Road safety audit



Thank you for your attention

Discussion welcome