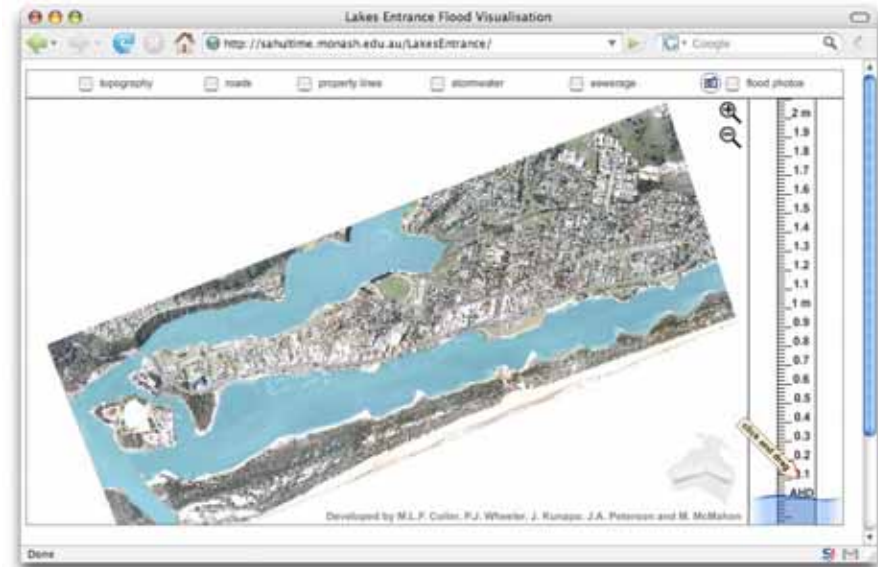


FACILITATING COASTAL ZONE INUNDATION AWARENESS USING GIS-BASED SCENARIO MODELLING AND MULTIMEDIA VISUALISATION



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MONASH University



Introduction – Lakes Entrance (Victoria, Australia) case-study

Inundation of low-lying coastal land/water interface areas an ever-present threat – especially at coastal lagoons/tidal inlets

Inundation caused by convergence of environmental ‘forcings’ (e.g. storm surge, catchment floods, winds, tides, passage of low pressure systems)

Settled with high-value real-estate

Lakes Entrance township developed from 1838 – pastoral run – fishing village – holiday centre – large SE Australian commercial fishing port



Coastal geomorphology - considerations

Late Pleistocene – sandy barrier deposition phases caused formation of extensive coastal lagoon system

Current outer barrier deposited during Holocene (Flandrian Transgression 6-6.5Ka) – SE swell wave environment, quartz sands, micro-tidal (<1.0 m)

Lakes Entrance located on low-lying (<1.8m AHD) fossil sandy barrier formation



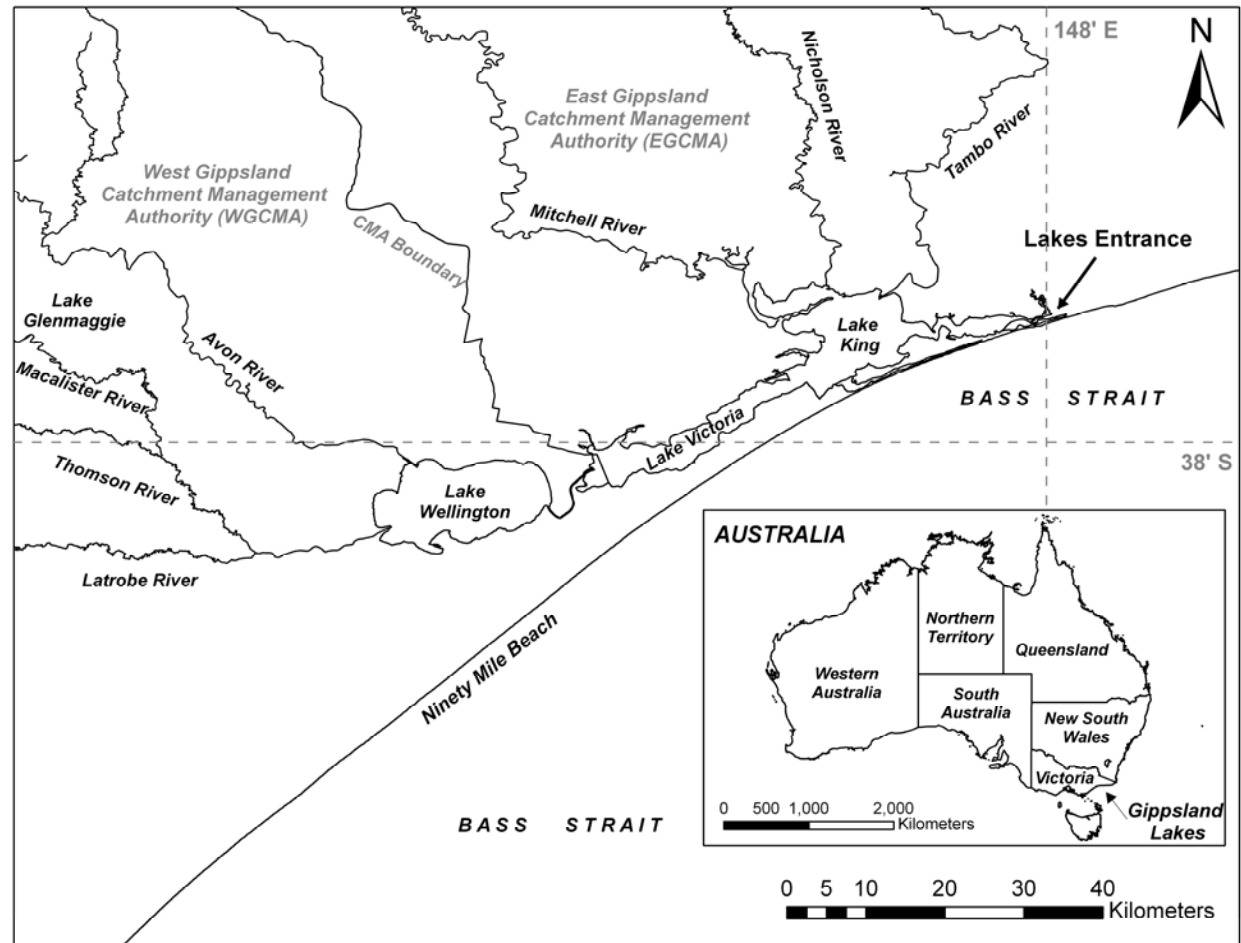
Gippsland Lakes catchment

Over 20,000 km² - 7 major inflowing river systems

Drain high rainfall/snowfall areas of Eastern Highlands

Major reservoirs include Thomson Dam and Lake Glenmaggie

Managed by sectorally-based organisations (e.g. DSE, CMAs, Ports, LGAs)



Relevant inundation research reports:

Grayson *et al.* (2004) – Lakes Entrance inundation levels:

1:20 year (5% AEP) = 1.3m AHD

1:50 year (2% AEP) = 1.6m AHD

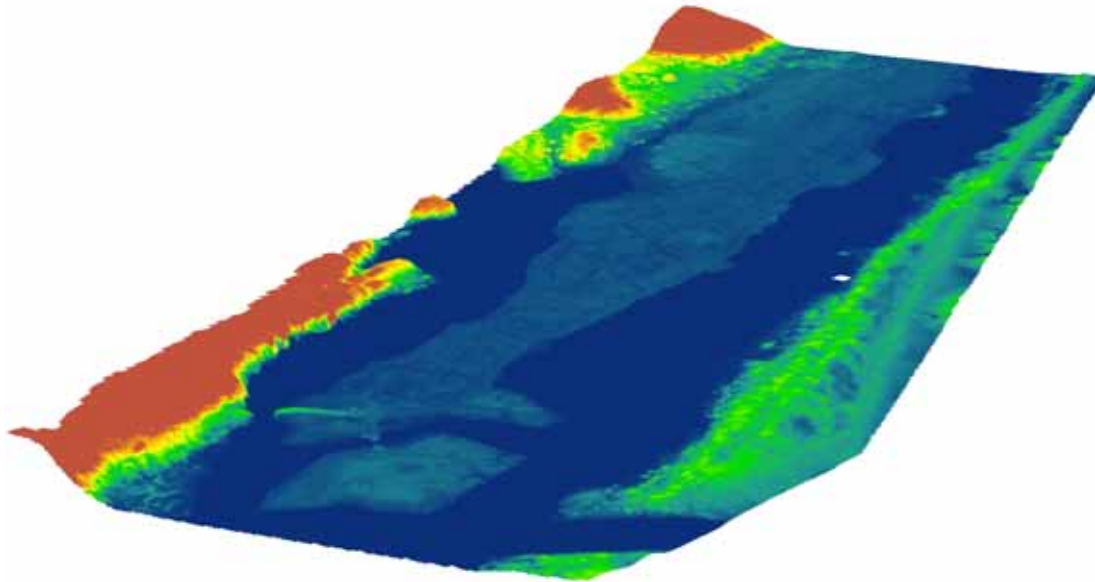
1:100 year (1% AEP) = 1.8m AHD

Current EGPS LSIO for Lakes Entrance - 1.8m AHD – 1:100 year flood event

No stakeholder flood inundation scenario modelling – no user-defined spatial decision support accessible to all stakeholders

Spatial data handling – user-defined scenario modelling





DEM construction and validation

Wheeler, P., Kunapo, J., Peterson, J. and McMahon, M. (2007) [Mapping relative inundation vulnerability of land parcels on low-lying ground: exemplification with a photogrammetrically-derived DEM-based model of Lakes Entrance, Victoria, Australia.](#) *Spatial Science Institute Biennial International Conference*, May 14-18, 2007, Hobart, Tasmania, Australia. 902-915.



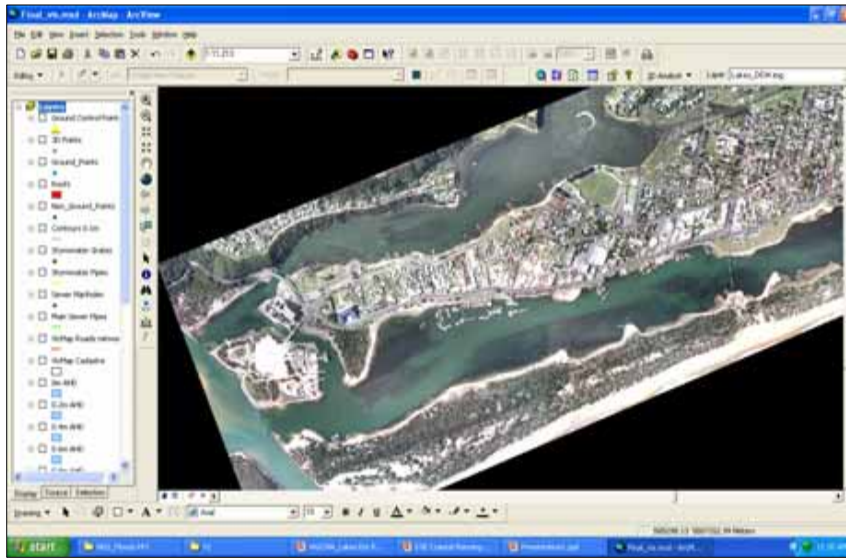


Queensland Spatial Conference 2008 – 17-19 July 2008, Gold Coast
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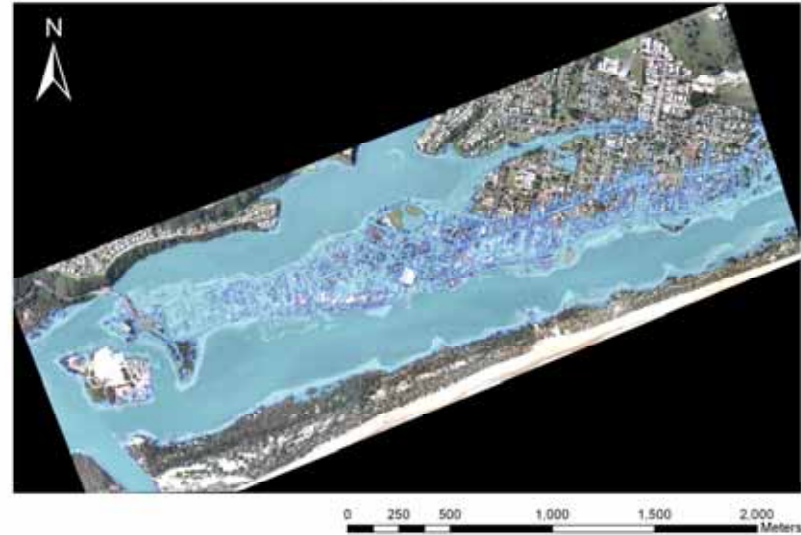
Derivation of inundation scenario extents using GIS 0m to +2m AHD (0.1m extents)



Lakes Entrance Township - 5% AEP (1:20 year) Inundation Extent (1.3m AHD)



Lakes Entrance Township - 2% AEP (1:50 year) Inundation Extent (1.6m AHD)

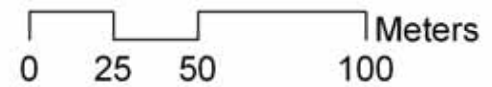




**Mechanics Hall - Lakes Entrance
+1.0m AHD Flood Scenario**

Legend

- Stormwater Inlets
- Stormwater Pipes

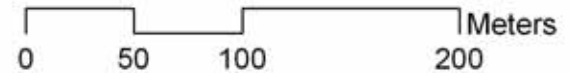




**Lakes Entrance
+1.2m AHD Flood Scenario
'At-risk' Sewer Assets**

Legend

- Sewer Manholes/Pumpstations
- Sewer pipe network
- +1.2m AHD



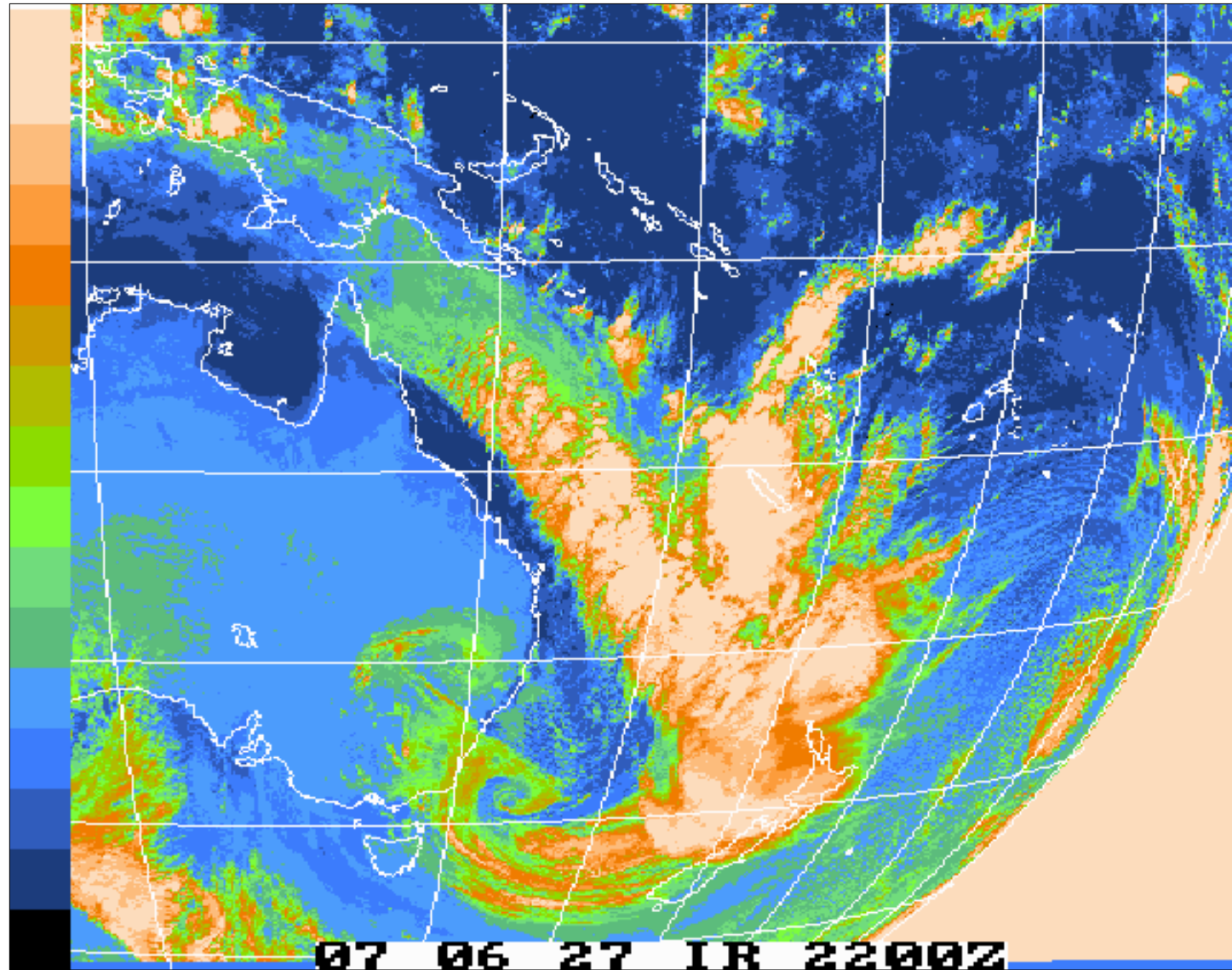
June 2007 Gippsland Lakes catchment floods

'East coast
low'

300-500mm
rainfall in 3
day period

Storm surges
along
Gippsland
coastline

High winds





NASA Modis 250m 30 June 2007

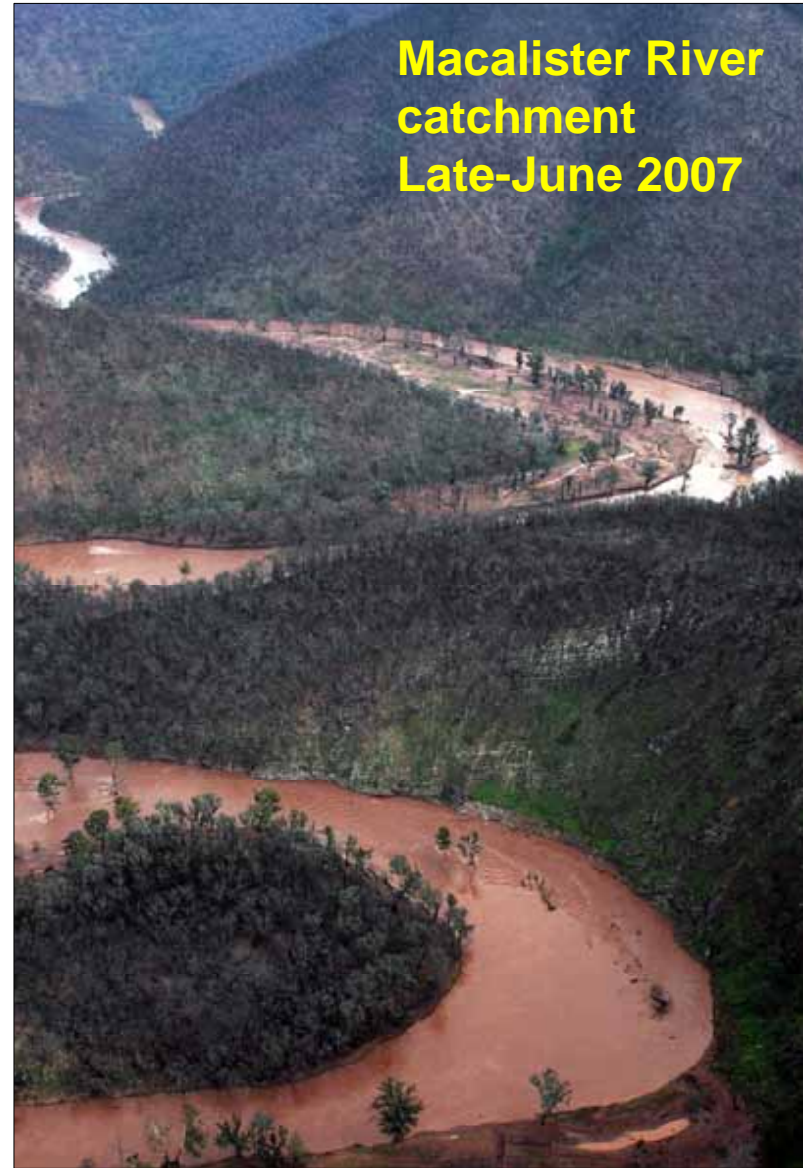
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**Small sub-catchment (<math><5\text{km}^2</math>)
Macalister River catchment (post-
fires/floods)**





**Gippsland Lakes
Artificial Entrance
30 June 2007**

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Lakes Entrance township flooding June 2007

Maximum inundation extent 1.3m AHD

Maximum heights reached during
spring (high) tides (at night)



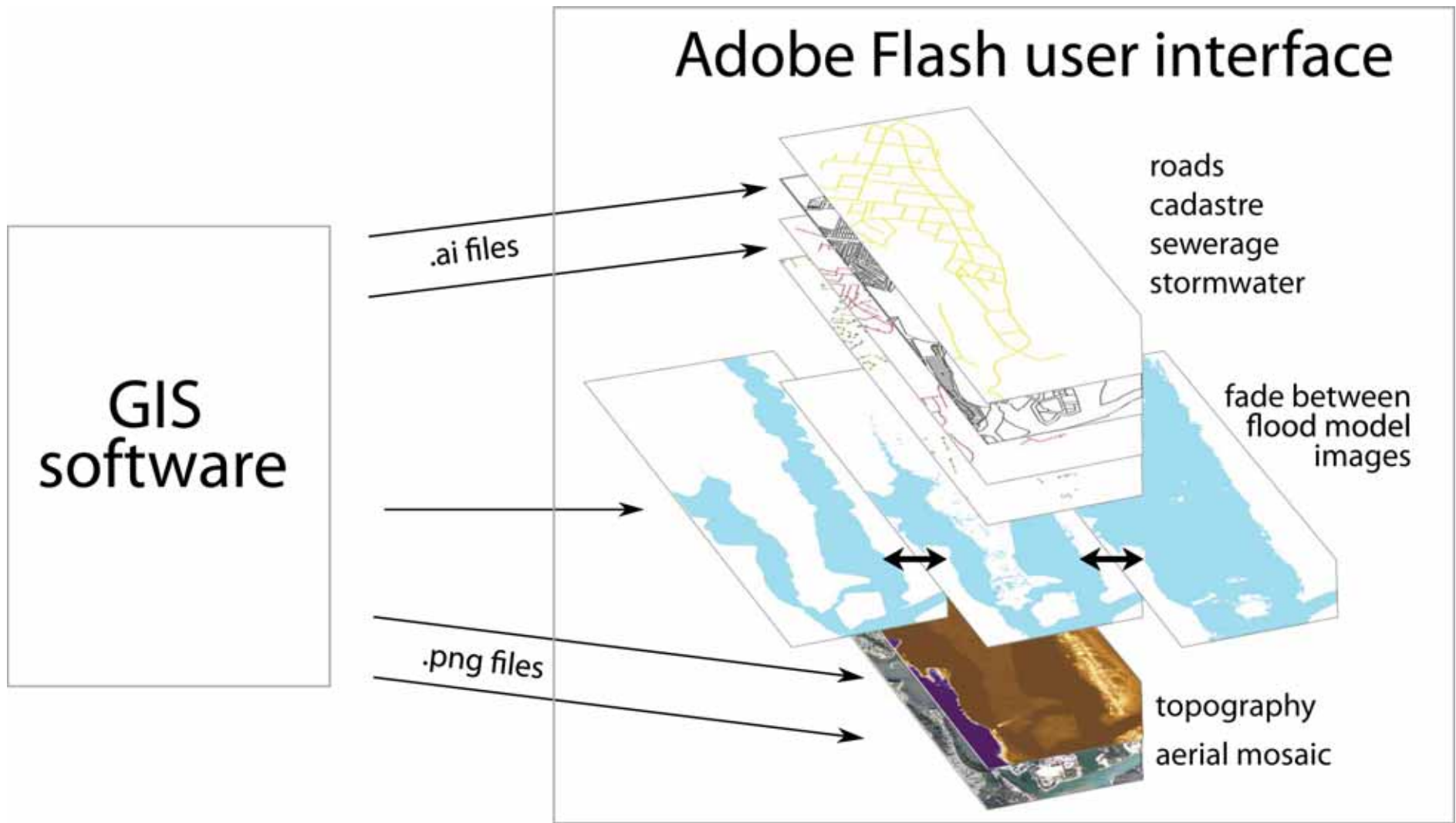


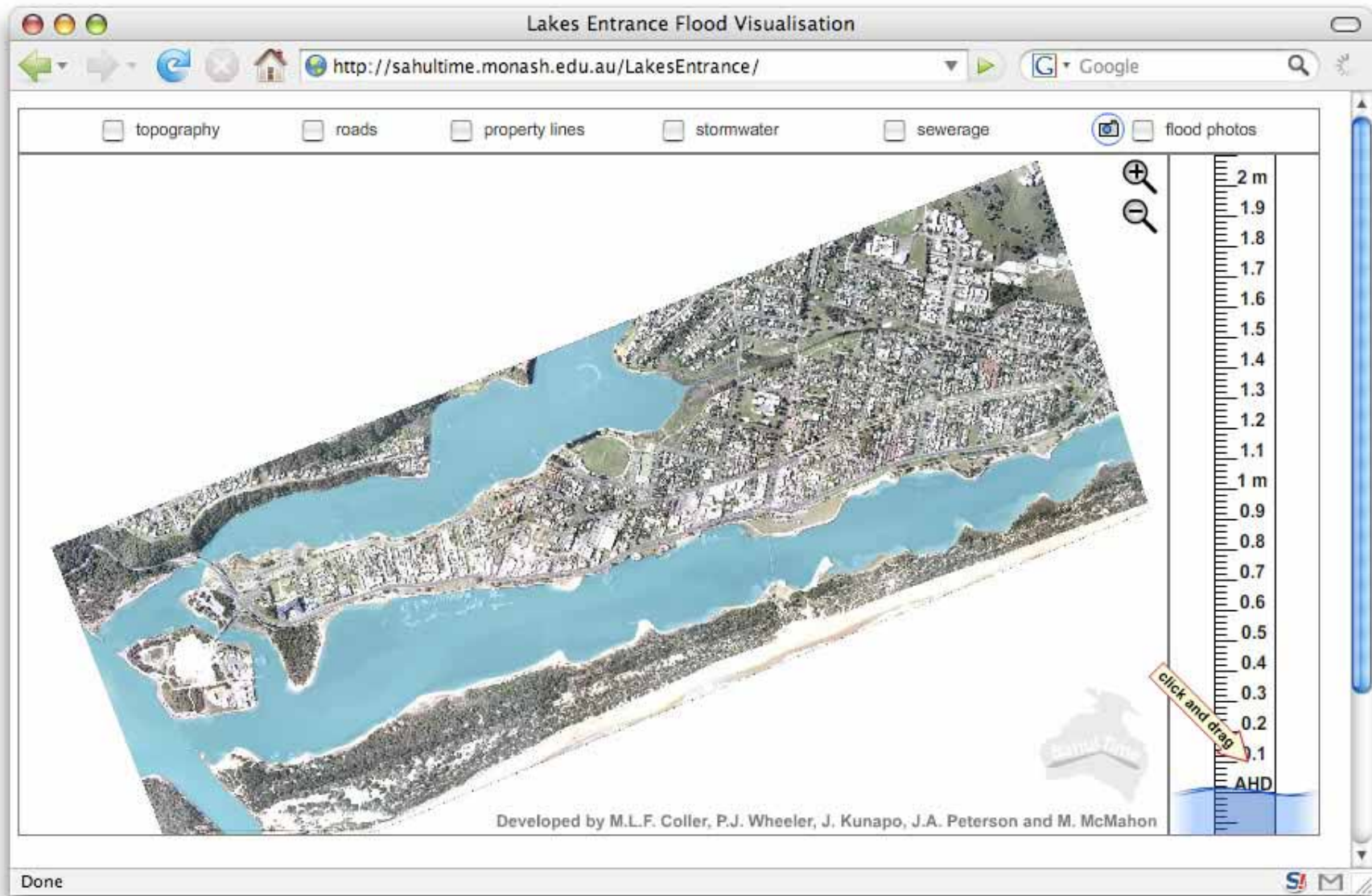
Lakes Entrance township flooding June 2007

Inner-dwelling flooding via shower
bases

Raw sewage discharge via ORGs







<http://sahultime.monash.edu.au/LakesEntrance/>

[Local link](#)

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Conclusions

The future for Gippsland coastal areas?

Visualisation tool very successful for promotion of inundation awareness and consensus-building amongst Gippsland ICZM stakeholders

Future challenges

High-value real estate located in low-lying areas; 'sea-change' phenomenon – continued demand for coastal living in Gippsland

Climate change scenarios for West/East Gippsland (e.g. *more intense bushfires, more severe weather events, severe catchment flooding, severe storm surges*)

Sea level change/coastal erosion/coastal subsidence scenarios



Questions???



A horizontal banner for the Queensland Spatial Conference 2008. The banner has a green background with orange and white text. On the left, there is a circular inset image of a coastal city skyline. In the center, the text reads "Queensland Spatial Conference 2008" in white, "Global Warning:" in large white letters with a globe icon for the 'o', and "What's Happening in Paradise?" in orange. To the right of the text is the logo for the Spatial Sciences Institute (SSI), which consists of a stylized blue and orange shape above the letters "SSI" and the text "Spatial Sciences Institute" below. Further right, the dates "17-19 July 2008" are listed in white, followed by the location "Holiday Inn, Surfers Paradise" and the website "www.qsc2008.com.au". On the far right, there is a circular inset image of a galaxy and the year "2008" written vertically in a large, light green font.