



**JBA**  
consulting

## **Flood: Australia and other international exposures**

Prepared for the CAS Spring Meeting

**Jane Toothill**

**Jane.toothill@jbaconsulting.co.uk**

**+44 (0) 1756 799919**

**+ 44 (0) 7733 228202**

---

**“The recent flooding in Australia has led to increased attention to the risk of inland flooding across the globe. Is the insurance industry prepared for these risks?”**

- A decade of flooding: Putting Australia into perspective
- Overview of the Australia flood
- Flood risk management solutions available elsewhere
- Are they applicable in Australia?



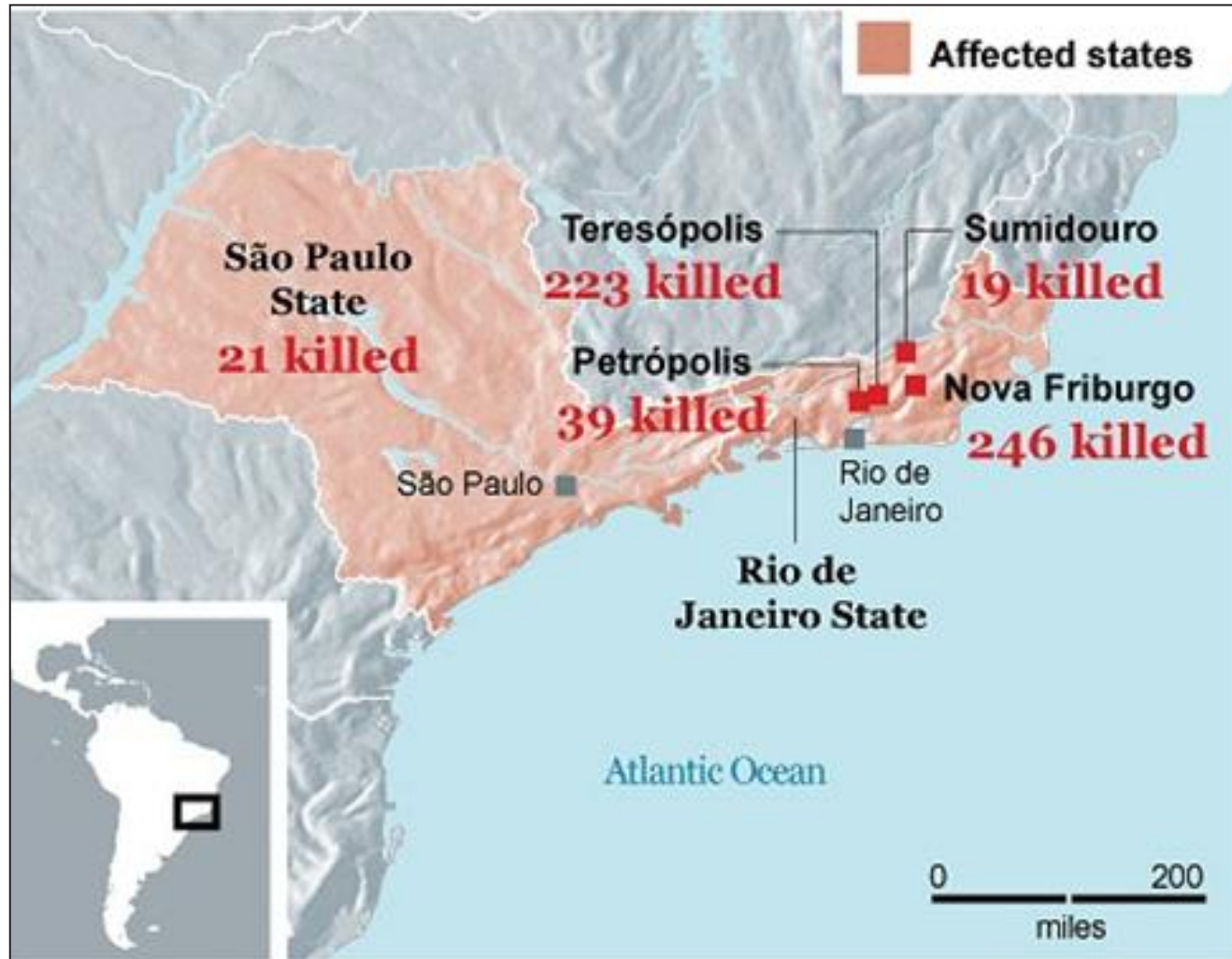
**JBA**  
consulting

## **A decade of flooding: Putting Australia into perspective**

# Global perspective: 10 largest flood events 2000-2010 by damage (USD)

Country	Year	Dead	Damage (mUSD)	Main cause	Area / 000s km <sup>2</sup>
USA – Katrina	2005	1,053	60,000	Tropical cyclone	50
C. Europe	2002	55	20,000	Heavy rain	252
UK	2007	7	6,500	Heavy rain	24
USA – Rita	2005	0	6,000	Tropical cyclone	33
UK	2000	0	5,900	Heavy rain	5.3
Southern Iran	2001	6	5,000	Torrential rain	0.5
Mexico	2007	19	5,000	Heavy rain	36
China	2007	600	4,250	Heavy rain	1,916
India	2005	987	3,500	Monsoon rain	35
SE Asia - Bilis	2006	629	3,328	Tropical cyclone	612

# Brazil, 13 January 2011



# Brazil, 13 January 2011

- Worst flooding Brazil has seen in 44 years resulting in floods and mudslides and killing over 740 people
- Some areas received over 10 inches of rain in a few days – the average rainfall for the month is only 11 inches
- 6000 people left homeless
- 8000 people relocated to shelters
- Damage has been estimated at \$1.2 billion





**JBA**  
consulting

## Overview of the Australian flooding

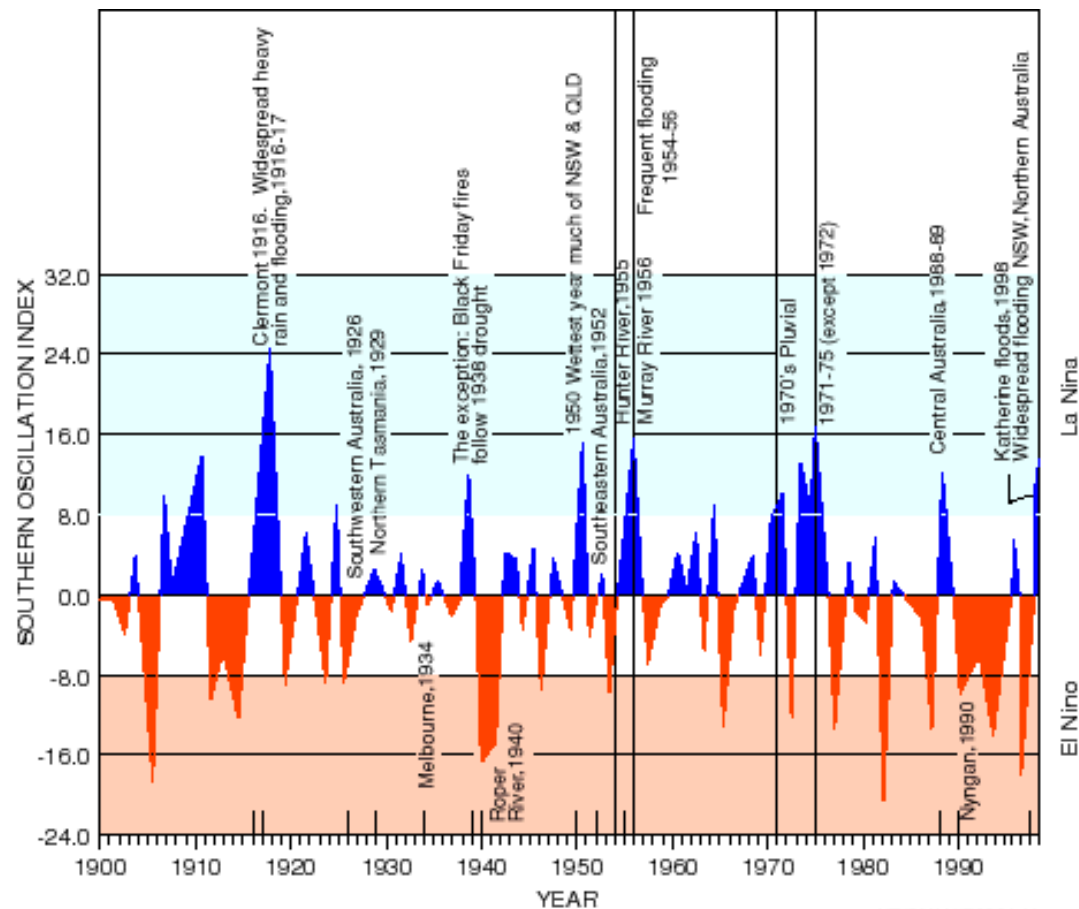
# Australia: What happened?

- Sequence of heavy rain events in December 2010 – January 2011
  - Flooding in Queensland between Christmas 2010 and mid-January 2011
  - Flooding in Victoria from 12<sup>th</sup> January
- Cyclones
  - Tasha: Cat 1 made landfall on 25<sup>th</sup> December
  - Yasi: Cat 4 made landfall on 3<sup>rd</sup> February
- Continued wet weather in March
  - SCS 31: Wettest March on record in Australia
  - SCS 32: Exceptional rainfall in Kimberley, W Australia





- Wet Australian summer exacerbated by occurrence of La Nina
  - December SOI of +27.1: highest December value on record
  - Near-record sea surface temperatures
  - Previous strong La Nina events (e.g. 1955 and 1973/74) also associated with widespread flooding in E Australia



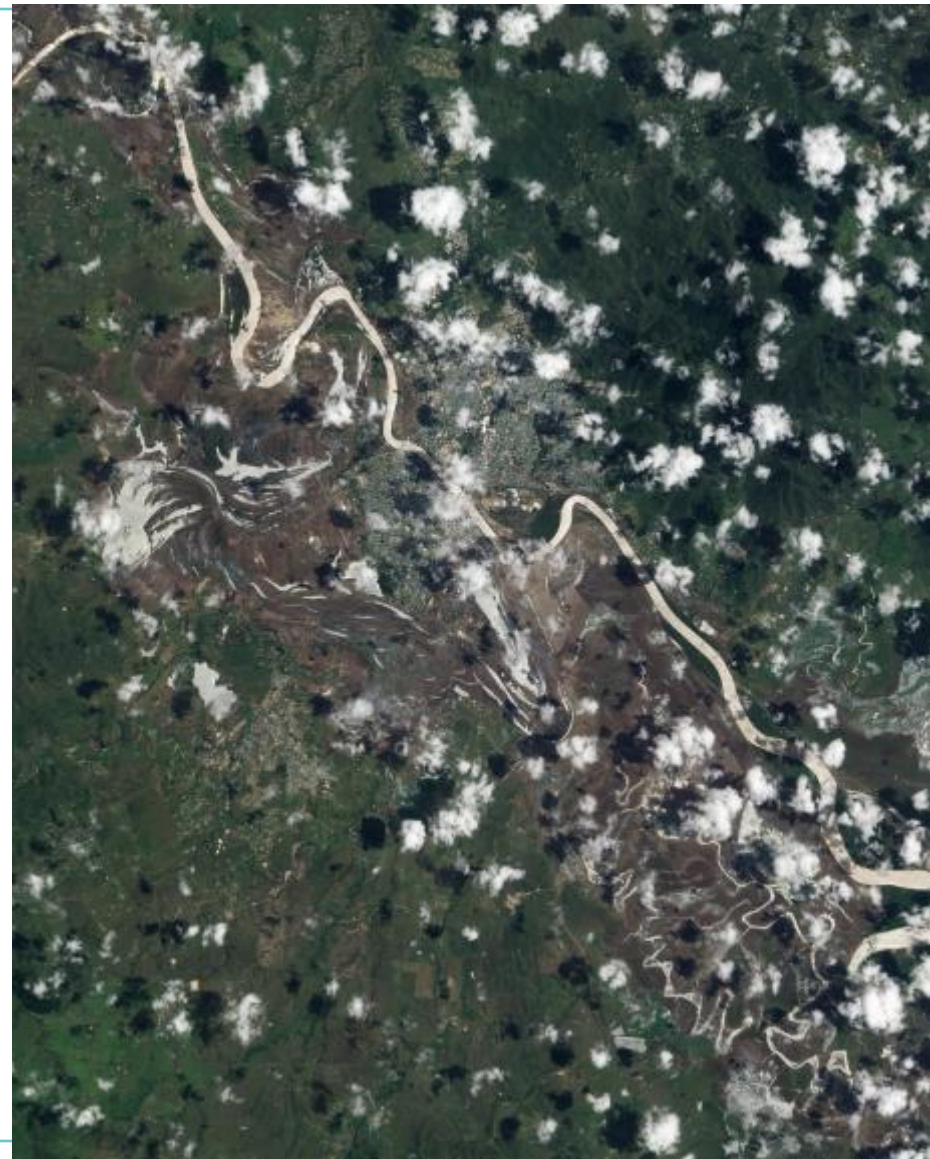
- Overview:
    - Monsoon disturbance fed by high moisture available from La Nina conditions
    - Wet spring followed by passage of a sequence of complex and persistent low pressure systems from late November onwards
    - BOM: 6 major rain events from late November – mid-January
  - Rainfall:
    - Queensland / E Australia: Wettest December on record
    - Victoria: Wettest January on record halfway through the month
    - Australia: Wettest March on record
  - Perspective:
    - 1974: Substantially higher rainfall
    - 1893: Probably heavier again
-

# Australia: River levels

- Occurrence of flooding:
  - Burnett, Condamine & Fitzroy basins from late December
  - Brisbane and Mary basins from early January
  - Flooding in Victoria from the 12<sup>th</sup> January
- River flooding + “flash” flood
- Flood “events”?
  - Sheer scale of basins makes flood levels difficult to link to a single meteorological event

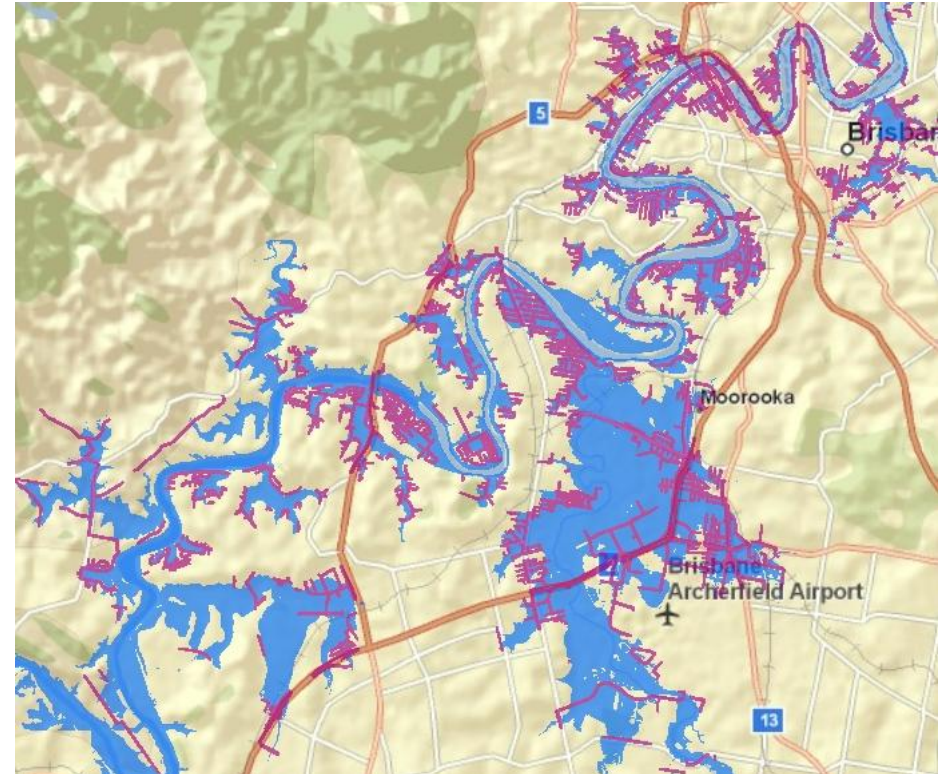


# Australia: Impact



# Australia: Impact in Brisbane

- Brisbane River on 13 January
  - 1m lower than predicted and 1m lower than in 1974
  - Water released from protective Wivenhoe dam
  - 67 suburbs affected and 26,600 homes inundated (many more than in 1974)
  - 5,000 commercial properties inundated
  - CBD closed for 4 days & power cuts to 200,000 homes



# Australia: Impact

---

- 97 towns and cities affected, some close to completely flooded, e.g. Chinchilla, Emerald
  - >200,000 people affected with 36 dead
  - Economic damage estimates ranging up to USD 20 billion
  - By 30 January: ICA had registered 38,460 claims worth \$1.51 billion:
    - Insurance claims Queensland: >38,460 \$1.5 billion
    - Insurance claims Victoria: >4,780 \$69 million
  - 46% RB, 25% RC, 10% CB, 11% CC, 8% BI
  - Impacts on mining, agriculture, transport and communications, marine business
-

# Australia: Insurance situation

---

- “Flood” split into
    1. Flash / storm / rainfall-runoff
    2. River and inland flood
    3. Sea level rise and storm surge
  - Good level of coverage for commercial property but household cover variable per provider: Many cover flood damage but not storm
  - Ongoing development of National Flood Information Database
  - Background of rising rates in the last months:
    - Perth/Melbourne hail: \$2.1 billion
    - Victoria bushfires: \$1.07 billion
-

# Australia: Since the event

---

- Federal government announced one-off flood levy to assist with infrastructure rebuilding cost
- Announcement that QLD state reinsurance cover will be investigated
- ICA repeatedly reiterated its call to local governments to release flood map data:

*If more widespread mapping and data were available for QLD, more insurers would be able to price the risk, leading to more flood products being offered to the QLD community” – Rob Whelan, ICA CEO*

- March 4, 2011 – ICA supports National Disaster Insurance Review
    - Standard definition for flood
    - Provision of adequate flood data
    - “encourage greater personal responsibility in the community... abolish all insurance taxes”
-





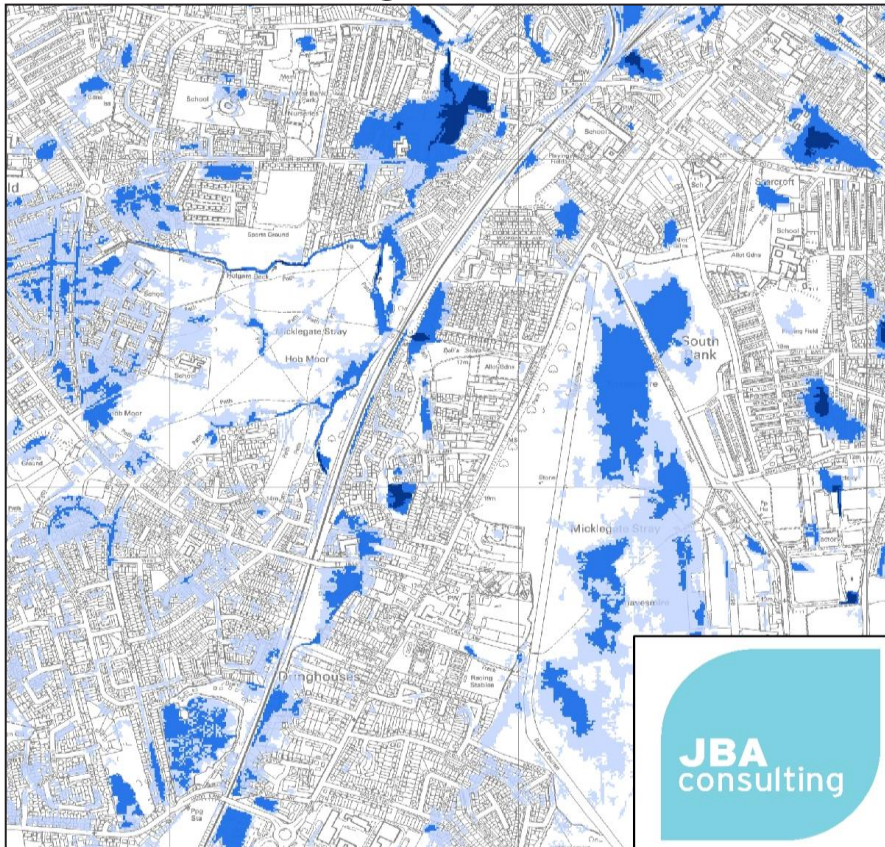
**JBA**  
consulting

**Flood risk management solutions  
available in other countries**

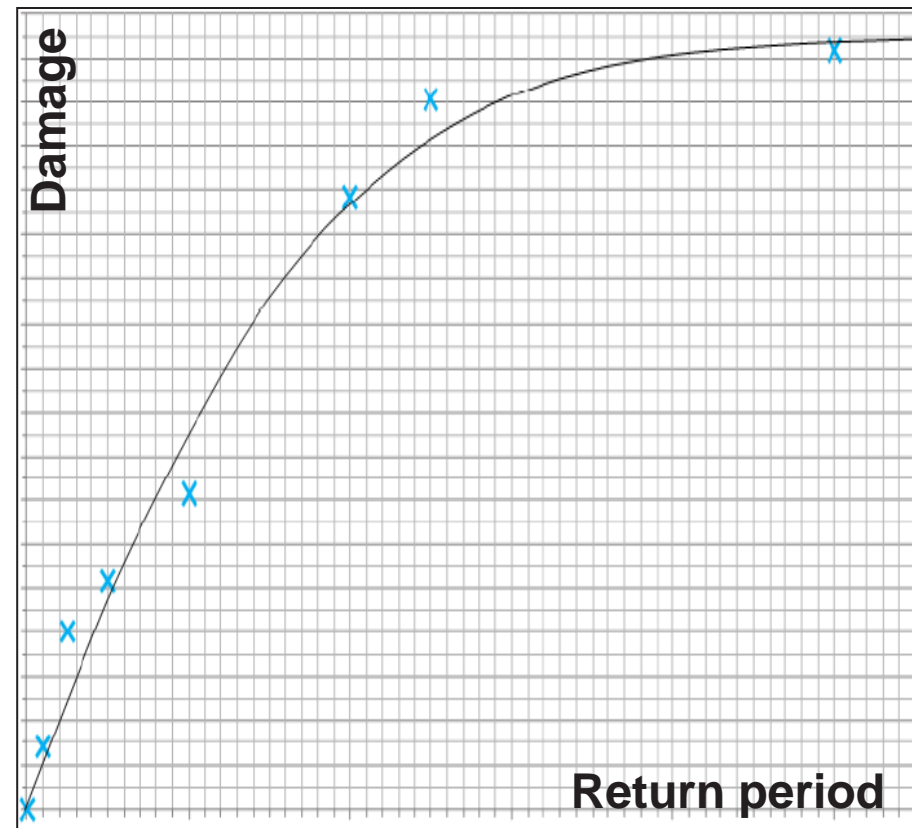
# Flood risk management solutions

- Broadly two types of solution exist:

**Mapping** – used for underwriting



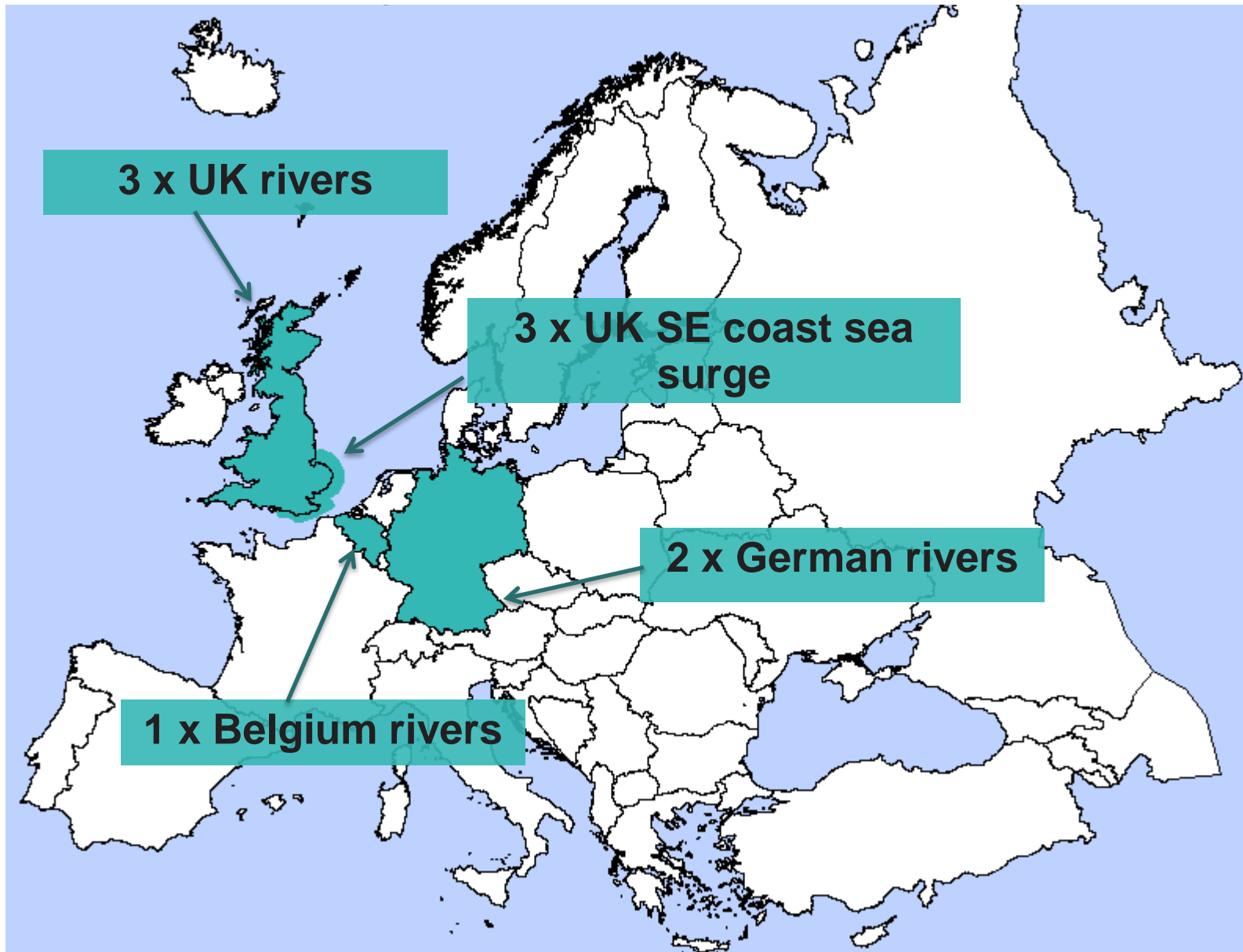
**Probabilistic** – used for accumulation



# Flood modelling: The European Example

Country	Year	Dead	Damage (mUSD)	Main cause
UK	Autumn 2000	0	5,900	River, rain
C. Europe: Deu, Aut, Cze, Hun	Summer 2002	55	20,000	River, rain
Switzerland	Summer 2005			Rain, river
UK	Summer 2007	7	6,500	River, rain
C Europe: Cze, Aut, Pol, Deu	Summer 2009			River, rain
UK	Autumn 2009	1	150	Rain, river
France (Xynthia)	February 2010	47 France	3,000 incl. wind	Sea surge
C Europe: Pol, Hun, Cze, Slk	May 2010	18	3,000	River, rain
France	June 2010	22		Rain

# Probabilistic flood model availability in Europe



# Flood modelling: The European Example

---



- UK:
    - Widespread availability of mapping and probabilistic solutions from multiple providers
    - Demand and availability of mapping solutions increased after 2007 floods
  - Germany:
    - Market model ZURS has inhibited development of alternative solutions
    - Probabilistic models are available in wake of 2002 floods (EQECAT, RMS)
  - France:
    - River flood is not on the private market; only one insurance model exists (mapping / JBA)
  - Czech Republic:
    - Market-led initiative after 1997 generated flood hazard maps...
      - ... in turn led to improved exposure data
-

# Flood modelling: The European Example

---

- Poland:
    - No commercially available flood maps or models despite recent events
    - Initiative to develop flood maps and probabilistic model led by PIU failed
    - Wide availability of broker-development solutions viewed as meeting needs of insurers
  - Austria, Switzerland:
    - Market-led initiatives have led to development of insurance community-owned flood maps
    - No probabilistic models are available
  - Norway, Spain:
    - Flood is not on the private market; no solutions exist
-

# Flood modelling: The European Example

---



- Flood mapping solutions are available from a variety of sources (commercial, public sector, single solution insurance-led) in many countries
  - Development of probabilistic models has been extremely limited – BUT reinsurance costs are driven by wind not flood in Europe
  - Development of in-house models by reinsurance brokers has inhibited development of probabilistic models in some countries
  - Where insurance exposure data are of high quality, flood events have led to the development of improved mapping tools, resulting in improved underwriting practice; one example the other way round
  - Availability of models is greater in countries where flood is insured on the private market
-



**JBA**  
consulting

**Might similar solutions be of assistance in Australia?**



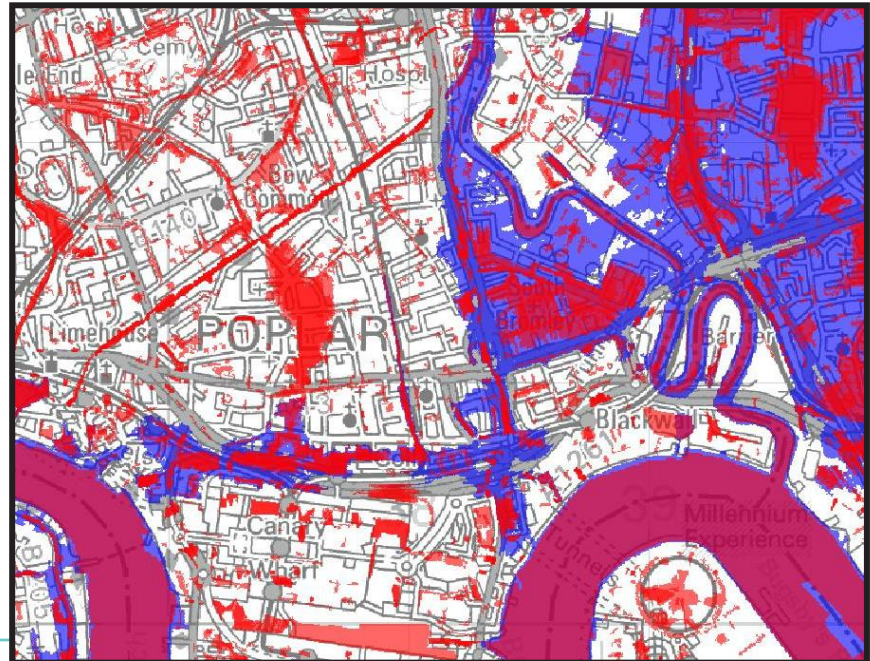
# Australian flood modelling: Is there a need?

---

- Flood is Australia's costliest type of natural hazard – losses estimated at > A400 million per annum (prior to 2010; Bureau of Meteorology)
  - Mixed messages from the market:
    - *ICA: Local government should release flood data*
    - *IAG: "The poor quality and limited coverage of flood mapping across Australia has made many reluctant to offer flood insurance as a standard policy."*
    - *Insurer B: Adequate information is available*
  - About 90% of Australia is mapped by the government
  - No probabilistic solutions exist
-

# Australian flood mapping: Will it assist?

- Technically speaking, areas at risk to flood can easily be assessed
- Stitching together data from different sources is not ideal and has not been the preferred approach in the UK
- Development of a consistent mapping solution for urban areas at risk would enable companies to implement a consistent underwriting practice
- Perils can be mapped separately or in combination
  - Rainfall / storm
  - River



# Australian flood mapping: Will it assist?

---

Mapping solution will only help if:

- Companies are in a position to choose terms and conditions applied to individual risks and/or select/deselect risks on basis of flood exposure
  - Unlikely to be demand if risk is pooled
  - Adequate exposure data are available
    - Lat/long
    - Street address
-

# Australian probabilistic modelling: Will it assist?

---



- Technically feasible at a range of levels of detail and for multiple flood “types”
  - Challenges
    - Determination of event types and match to policy wording
    - Scale: Focus on largest centres of exposure is sensible
    - Defence modelling: Inclusion of different defence mechanisms, e.g. Wivenhoe
    - Cost: Australia is a large place – model resolution must be considered
  - Probabilistic modelling will not help if the model omits major sources of exposure (e.g. covers river flood but not storm flood)
-

# Australian probabilistic modelling: Will it assist?

---



Probabilistic modelling will help most if:

- Exposure data are continually improved
  - Industry reaches a standard “event” definition
    - Flood type
    - Hours clause
  - Model addresses multiple flood sources
  - Scenario modelling?:
    - Useful for companies who wish to assess their PML in the wake of the 2010/11 event
    - Useful pre-cursor to a probabilistic modelling work
-

# Conclusions

---

- The December 2010 / January 2011 flooding in W Australia was the most costly natural hazard event to affect the country to date BUT was not without precedent and can be expected to recur
  - Significant challenges exist for the insurance community in mitigating flood risk
  - The development of flood maps and models is technically feasible and provides one component of a potential solution
-



**JBA**  
consulting

**Thank you for your time**

# Copyright, IPR and Disclaimer

---



© Jeremy Benn Associates Limited 2010

Title to and copyright and all other intellectual property rights in the maps described herein and in the data specifications, drawings, descriptions and documentation provided by JBA belong to and shall remain the property of JBA. The reader shall not (save only as may be permitted by law and not otherwise) copy, reproduce, record, adapt, modify, reformat, reverse compile them in whole or in part, or do any other such act which may affect JBA's rights or interests therein.

This document has been prepared as a presentation for the CAS Spring Meeting 2011. JBA Consulting accepts no responsibility or liability for any use that is made of this document . JBA Consulting has no liability regarding the use of this report.

All flood data is the property of Jeremy Benn Associates Limited and must not be copied or used other than as authorised in writing by JBA.