



Natural  
Hazards  
Research  
Australia

# Unlocking risk: Enhancing hazard risk assessment through historical archival reanalysis

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T8-A6

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# Why archival and palaeo-environmental records?

- Instrumental records are relatively short
- Difficult to develop risk profiles without long-term information
- Is there vital information in the archives that could improve our understanding of past events?
- Do numbers 'about risk' resonate with the public?



# Palaeo data informing baselines - what's 'normal'? SDG6.6

Long-term data suggests:

- Short term baselines can be very inadequate/inaccurate
- They often do not reflect optimal/average conditions
- Moving baselines dangerous
- Universal baselines ignore natural spatial and temporal heterogeneity



# Scope of project

- Three case study regions: Northwest-central WA, Southeast Queensland, broader Adelaide-Flinders regions
- Three hazard types: Earthquakes, cyclones, storm surge
- Finding out what stakeholders use/want/current gaps
- Diving into various archival/historical records
- Gathering expert opinion/knowledge about available information
- Developing a methodology to translate qualitative information to quantitative data
- What else of value can be derived from historical information?
- Indigenous knowledge

# Sources of historical/palaeo-information about natural hazards

- Newspaper articles (partially digitised by TROVE)
- State and local government reports, correspondence, photography, shipping and mining reports, weather recordings, diaries, etc. (held by National Archives, State Archives, libraries, companies etc.)
- Tree rings
- Corals
- Sediments



# Complications in using historical data in analyses of risk: cyclones

- Changes in measurement techniques over time
- Early records may simply be observations without data (ie qualitative)
- Inconsistencies across space
- Observation stations/reports in remote areas

# How might historical/archival information be useful? Cyclones

- Evidence cyclones tracking further south over recent decades?
- Could any southward 'move' be related to climate change?
- It is generally considered likely they will become more intense
- Implications for building standards – are we ready?

# Cyclones have penetrated into NSW before

“..... looking eastward I saw a wall of water fully 50 feet high coming around the bend. Astonished, I watched it .... submerge (i.e. exceed) the 1890 flood mark knob, .... saw the flood not only covering the flat (nearly a mile wide) on the far side of the upper Brisbane River (whose channel it had overflowed)..... saw-mill logs (as we found subsequently, when we saw them left high and dry near a drafting camp on a ridge in the top ....

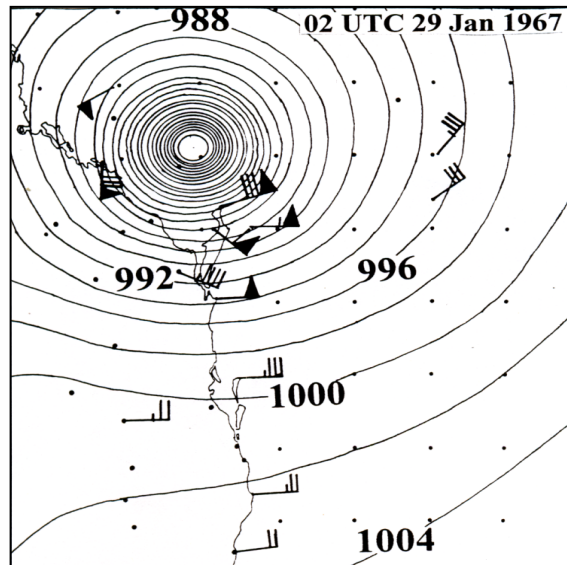
.....telegram addressed to the Postmaster-General in Brisbane: “Please warn inhabitants of Brisbane, Goodna, Ipswich, Lowood, other centres, of tremendous flood, 1890 level already exceeded several feet. Stanley River only, Brisbane to follow.” ...the Indooroopilly railway bridge swept away along with the Victoria Bridge in the Brisbane CBD. At least 150 houses were also swept down the Brisbane River.

- Late 19<sup>th</sup> century a period of intense storm and cyclone activity in eastern Australia
- 1883 – 1898
- Current exposure and vulnerability
- Low frequency variability / climate change
- Can documentary records from these events teach us anything about resilience?
- Loss of long-term organisational and individual memory

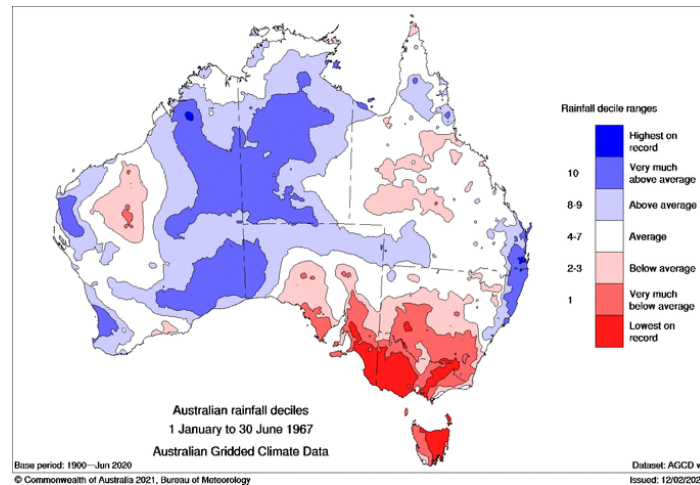
**See Callaghan 2020, Journal of Southern Hemisphere Earth Systems Science 70(1) for more detail of this stormy period**

# 1967 and compounding events

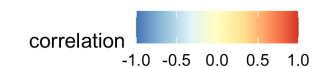
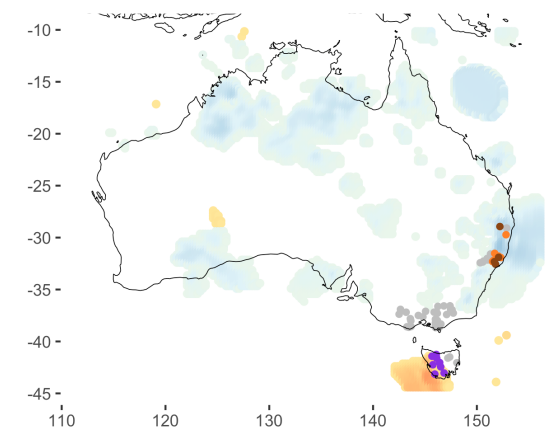
Cyclone Dinah, ~28-30 Jan 1967 and southern Tasmanian bushfires 7<sup>th</sup> Feb 1967



Rainfall Jan-June 1967, BOM



What does palaeo data suggest about this north/south pattern in the east?



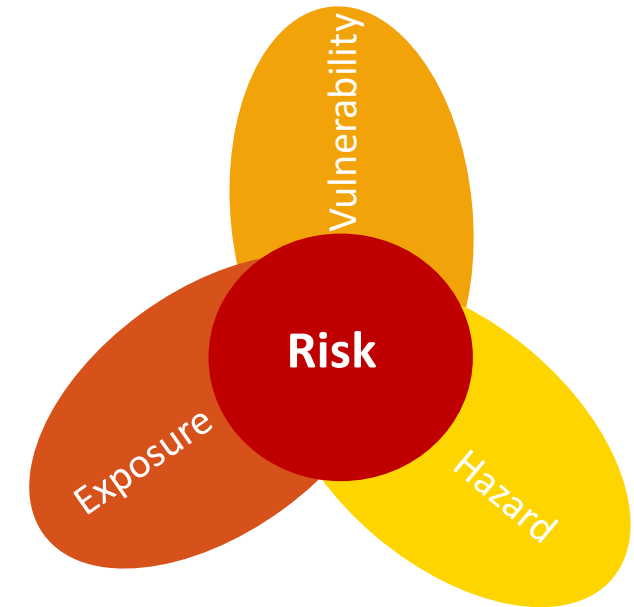
# Interviews with stakeholders and experts

- Loss of institutional memory – the short-term view of risk
- Lack of mechanisms to pass on relevant knowledge
- After-event reviews common, but acting on lessons harder
- Mixed views on value of historical records
- A handful of ‘trusted information sources’ (e.g. BOM, Geoscience Australia, other government agencies, some research).
- Exposure and vulnerability are key concerns
- Relevant information that could inform risk often “hidden” in academic publications, spread across platforms
- Barriers to data access
- Desire for spatially defined data/information
- Understanding of likely impacts key



# Summary

- Three hazards, three case study regions
- Understanding gaps, what people in planning and emergency services need
- Understanding perceptions of how historical data can be used
- Collating and analysing historical and palaeo records
- Considering when appropriate and how these records can be transformed into quantitative information for risk estimation
- Can these records be useful in other ways? Storylines?



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