

Key findings:

East Coast Lows and the Newcastle-Central Coast *Pasha Bulker* storm

The event

A total of five east coast lows (ECLs) affected coastal regions between Illawarra and the Hunter during June 2007, which is a rare but not unprecedented event.

Of these five, the first (June 8-9) was the most serious (in terms of impact) and resulted in widespread flooding and wind damage, coastal erosion, the grounding of the *Pasha Bulker* (a 40,000 tonne bulk carrier ship) on Nobbys Beach, Newcastle and the loss of nine lives.

The '*Pasha Bulker* Storm', as it has become known, was one of the most significant meteorological events in Australia's history, with large economic losses and social disruption due to the loss of critical infrastructure.

Approximately 300,000 people were without mains electricity for four days (some for up to a month), the coal export chain halted for two weeks and communications were interrupted for days.

Scale of the disaster

The *Pasha Bulker* storm had three distinct impacts:

1. Flash flooding on the night of 8 June in the urban area of Newcastle and as far south as the Central Coast (about 1 in 100 year return period, impacting 800,000 people);
2. More general flooding on the Hunter River three days later (about 1 in 40 return period, impacting about 100,000 people); and
3. High winds and wave heights on the night of 8 June (the worst in the Newcastle-Sydney region since the '*Sygnia* Storm' in 1974).

The event ranks as the 8th most costly natural disaster to affect Australia, when adjusted for inflation and current development levels (i.e., all disasters based on current rebuilding costs), or the 4th largest adjusted for inflation alone.

Estimates of insured losses stand at around A\$1.35 billion with the bulk of the losses arising from the excessive rainfall and subsequent flooding, rather than from wind damage.



Pasha Bulker grounded on Nobby's Beach. Image: PJ Rosenberger

Characteristics that resulted in the damaging impacts of the event

The *Pasha Bulker* Storm had large impacts because of its location and persistence rather than because of its intensity, which was great but by no means unique. It developed close to shore, with the area of maximum rainfall centred on a highly developed part of the coast.

The intensity of the rain combined with the steep topography of the local catchments resulted in flash flooding throughout many areas of Newcastle and Lake Macquarie. Flooding was exacerbated by debris blockages within the stormwater drainage system (such as garbage/ recycling wheelie bins, corrugated iron and other fence panels, shopping trolleys and cars).

Gale force winds were sustained for approximately 20 hours during the event. Wind gusts of more than 120km/h uprooted trees, damaging and washing away power lines in the flood-waters. Tree throw was higher than expected because the storm was preceded by above-average daily rainfall so that soils were saturated and tree root stability was reduced.

Adaptation: during and after the event

Since the storm, Newcastle City Council has initiated a flash flood warning system for Newcastle. The system involves telemetered rainfall and water level gauges at numerous locations across Newcastle, linked to the Bureau of Meteorology (BoM). Information is then broadcast through local ABC radio and the BoM website

The various Councils affected by the event have carried out a number of community awareness/preparedness campaigns aimed at reducing vulnerability to such events.

A number of existing floodplain management plans have been revised. Priority (high-risk) catchments have been identified, in which new studies are currently being undertaken with more work planned for the future, to address current storm/flooding risk and to consider the implications of climate change.

The Eastern Seaboard Climate Initiative (ESCI) is a research program set up to investigate historical variability and future changes in ECLs.

Vulnerability: pre and post the event

The storms and resulting flooding came as a 'surprise' to most of the community, many of whom did not even realize that they lived within a floodplain. Since the event, community awareness campaigns have been aimed at reducing this key vulnerability. The new flood warning system has the potential to reduce community vulnerability.

During the storm there was no standard procedure in place for communication. Formal arrangements have now been made with local ABC Radio for provision of emergency information during a disaster.

The storm stretched the available capacity of health services in the affected regions, highlighting the difficulty health staff would have had in responding to a longer term disaster or secondary event such as an outbreak of food or waterborne disease.

Lessons learnt

There has been a broader recognition by government (both State and Federal) of the importance of ECLs and the need to better understand their historical variability and potential future changes under climate change. Also required is an improved understanding of the impacts of ECLs on coastal cities and the most appropriate adaptation response.

Key questions that need to be answered include:

- What causes periods of enhanced ECL activity?
- How likely is it to get back to back ECLs (e.g., five or more during a month such as what occurred in June 2007)?
- What is the likelihood of similar events occurring elsewhere in Australia?
- What are the climatological/oceanographic conditions that result in ECLs occurring close to the coast (as was the case with this event) rather than out to sea?

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Managing the event: successes and failures

Successes:

- Communication - ABC Radio, Newcastle supported the community by suspending normal programming and providing on-going radio coverage of the event and information on how people could access support services.
- Emergency services - (fire, police, ambulance, SES, community services and health services) all worked well together to manage the event.
- Community spirit – Many volunteers assisted.

Failures:

- Community awareness – Lack of community awareness around safe behaviour during flood events.
- Storm preparedness - Lack of community storm preparedness (first aid kits, torches, batteries, radios etc).
- Lack of accessible emergency services vehicles and dedicated Disaster Recovery Centres due to being cut-off by flood waters.

- How is climate change likely to alter the frequency and/or magnitude of ECLs in the future?

It is also clear that a consistent policy for coastal developments (agreement at Federal, State and Local levels of government) is needed to deal with existing coastal infrastructure/housing and planning guidelines around new infrastructure/housing.

Increased community awareness of emergency procedures and processes is also required, along with information and education opportunities which strengthen the community's sense of safety and confidence in preparedness for future disaster events.

About this study

This study is one of a suite of Historical Case Studies of Extreme Events conducted under Phase I of the NCCARF Synthesis and Integrative Research Program.

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The study will be available online at www.nccarf.edu.au

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