Editorial

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In 2002, Australian scientists attended an international conference where they proposed a tsunami early warning system in the Indian Ocean like the one that exists in the Pacific. The idea didn't go far – the ocean hadn't seen a tsunami in more than 100 years, and the vulnerable countries were generally too poor to pay for it.

However, if people had paid more attention to the work of Prof Ted Bryant there might have been a different response. Bryant has noticed the signs of past giant tsunamis on the east coast of Australia, and has used his research to gain an idea of how common such disasters may have been before historical records (p.28). Similar research around the Indian Ocean might have alerted people to the danger the region was facing.

The waves that crashed into Aceh on Boxing Day 2004 arrived so rapidly that a warning system may have made little difference there. However, for locations further from the earthquake zone, such a system could have saved tens of thousands of lives.

For all the power of modern technology, humans can still be almost as helpless as our ancestors before the might of nature. Caught too close to a volcano, tsunami or tornado there is not a lot we can do, so our best bet is to use modern science to predict these things, giving us the greatest chance to avoid being there in the first place.

However, our capacity for advanced warning varies depending on the type of disaster. Satellite imaging has enabled us to gain plenty of advanced warning of cyclones, for example, and as a result deaths are almost all avoidable. Not so for earthquakes, where we have almost no ability to predict when an earthquake will occur.

Worse than that, we still don't know much about the sites that are vulnerable to quakes. Mark Leonard of Geoscience Australia notes (p.37): "The problem predicting earthquake potential is illustrated by the fact that if an earthquake hazard map had been produced in 1988, it would have rated both Newcastle and Tennant Creek as low risk. However, earthquakes in Newcastle and Tennant Creek were the most damaging and largest Australian earthquakes in the past 50 years."

As the human population rises, and people choose to live by the coast or are forced to live in earthquake zones, there is a tendency for deaths from natural disasters to rise. Science needs to deliver even better predictions and society needs to pay constantly more attention if we're to minimise the death toll from disasters like the 2004 tsunami.

In order to do that we need to start with a clear idea of what the threats are. As Ken Lawrie of Geoscience Australia explains (p.??): "Natural hazard risk modelling is a stream of science that has been developed to mitigate, or at least significantly reduce, the devastating impact that natural disasters pose to communities."

The simplest sort of modelling relies on examining the historical record to find out what sorts of hazards exist and the impact they have had in the past. However, this can be inadequate for two reasons.

First, the historical record may not be long enough to be very useful. This is particularly the case in Australia. Aboriginal accounts of past disasters provide an insight into what can occur, but give no idea of how frequent such events are, and a little over 200 years of recorded history is not very useful for once-in-1000-year events.

A second problem is that for some sorts of hazards the risk is changing, particularly because of global warming. There is little doubt that human-induced climate change will produce more severe droughts, floods and bushfires. However, there is still considerable debate on how cyclones will be affected, and determining the local impact is even harder.

Source: Bushfire CRC

The CSIRO's Climate Impacts and Risk Group has been trying to refine our understanding of the threat of climate change to each state. Its most up-to-date report is on South Australia, but the difficulties are demonstrated when it reports that by 2030: "The region within 200 km of the coast shows annual rainfall changes between –15% and 0%, while regions further inland show changes between –15% and +7%" (p.36).

So things will get worse along the coast, but inland we may actually see more rainfall in more intense bursts, creating a greater risk of flooding.

One sort of disaster we are learning to fight is bushfires. The recent drought triggered some of the largest Australian fires on record, but improved firefighting techniques kept the death toll lower than in previous years. However, as Kevin O'Loughlin, Chief Executive Officer of the Bushfire Cooperative Research Centre, notes that technology such as helicopters has made a big difference to our fire-fighting techniques, but we still have lots to learn about how to use it most effectively (p.4).

Even when the dangers are fairly well-known, we are not always rational about planning for them. When people think of natural disasters, hail is probably not top of their list. Roy Leigh of Macquarie University points out that the most damaging event in Australian history, in terms of insurance losses, was the 1999 Sydney Hailstorm (p.11).

We also often think about the spectacular initial impacts of a disaster without considering secondary effects. Susanna Jenkins of Macquarie University notes that when Nevado del Ruiz, Columbia's highest volcano, erupted in 1985 there was little direct damage, but the melting of ice and snow triggered by the volcano's heat caused debris to pour down the mountain, killing 23,000 people (p.40).

Australians are probably more likely to be killed in a plane crashing as a result of flying through the ash from a volcano than they are by being caught near an eruption on the ground.

With all the advances in warning that science provides, mass disasters still occur and poverty is often the cause. Three people died when Hurricane Jeanne hit Florida head-on, but when it sideswiped Haiti the death toll was more than 3000 as a result of poor planning, bad housing and a lack of warning systems.

We are used to disasters causing huge death tolls in the developing world, but Australians were shocked when Hurricane Katrina flooded New Orleans – here was another rich nation experiencing the sort of disaster we like to think we have put behind us.

However, the loss of lives from Katrina was only possible because although America is a rich nation, New Orleans is a city with widespread poverty. Those with money had evacuated long before the hurricane hit.

The tools of science and technology can limit the damage from disasters, but it is up to us to decide how wide we spread the protection.

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