The cost of natural disasters in Australia: the case for disaster risk reduction

Ryan Crompton and John McAneney examine the cost to Australia of natural disasters.

Abstract

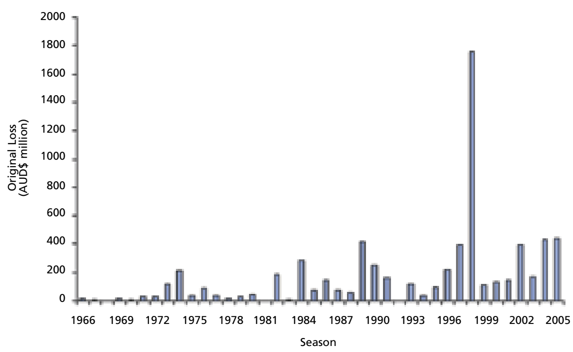
After adjusting the Insurance Council of Australia's Disaster List for 2006 societal conditions, we estimate Australia's average annual insured loss due to natural perils to be around $1 billion. Worldwide, the costs of natural disasters are increasing (Swiss Reinsurance Company, 2006) leading to concerns that human-induced climate change is contributing to this trend. The authors demonstrate that demographic and societal changes are overwhelmingly responsible for the increasing costs of natural disasters in Australia. While there is no guarantee that this situation will continue, the authors proffer the case for increased efforts and policies aimed at reducing the vulnerability of communities to natural hazards. Any gains in disaster risk reduction made will stand Australia in good stead now and into the future.

The Insurance Council of Australia's (ICA) disaster list

Our starting point is the ICA's Natural Disaster Event List (hereafter, called the "Disaster List") of significant insured losses. The first entry is the 1967 Hobart bushfires and for this and each subsequent event the database documents date of occurrence; type of hazard; areas affected; and total insured (industry) cost in "original" dollars. Although the threshold loss for inclusion in the database has varied over time, most events caused losses in excess of AUD$10 million. Our focus here is necessarily upon insured rather than economic losses for the simple reason that the former are measured, whereas economic losses are not. In developed countries, insured losses contribute a major part of the direct economic losses[1]. This will be especially true in Australia where insurance penetration has been traditionally high.

Figure 1a shows the original losses in the Disaster List with five geological events – four earthquakes and one tsunami – excluded in order to focus upon the impact of meteorological hazards, whose frequency and intensity may alter as a consequence of global climate change. Annual aggregate losses have been calculated for 12-month periods beginning July 1 to take account of the southern hemisphere seasonality of meteorological hazards; the series begins at the 1966 season (1966/67) and ends with the 2005 season.

Figure 1: (a) Original annual aggregate insured losses (AUD$M) for weather-related events in the Disaster List for 12-month periods beginning 1 July. (b) as for (a) but with losses normalised to current (2006) values. (Source: Crompton and McAneney (2008).)



Our interest is to estimate the likely losses if these same historical events were to recur, in particular, if they were to impact society in 2006. To do this, Crompton et al. (2005) developed a normalisation methodology to adjust for changes in population, wealth and inflation since the time of the original event. The approach uses the increase in the number of dwellings and the average nominal (in other words, in the dollars of the day) dwelling values as surrogates for population, wealth and inflation variables.

[1] In the US, for example, the National Hurricane Centre has often simply assumed that direct economic losses are roughly twice the insured loss (Pielke et al. 2008).

An additional factor that cannot be ignored under Australian conditions is the influence of building regulations that stipulate more wind-resistant construction in tropical cyclone–prone areas. These regulations were introduced in Darwin after Tropical Cyclone Tracy (1974), in Queensland officially in 1982, but in Townsville from about 1976, and in the rest of Australia in about 1990 (G. R. Walker, pers. com.). In this study we have assumed a 'common' introduction date of 1981, a year that also coincides with the Australian census. For complete details of the normalisation methodology, including the adjustment for tropical cyclone losses, the reader is referred to Crompton and McAneney (2008). In the next section, we discuss the normalised losses and then briefly examine the implications of these results for policy and disaster management.

Results

When correctly normalised for the variables mentioned above, the time series of insured losses (Figure 1b) exhibits no obvious trend (increase or decrease) over the last four decades. In other words, the increasing cost of insured losses over time is overwhelmingly explained by demographic and societal changes. Contrary to popular belief, there is no discernable evidence that human-induced climate change is significantly impacting Australian insured losses, yet. This is an important conclusion and consistent with that reached by Pielke and Landsea (1998) and Pielke et al. (2008) in relation to economic losses from hurricanes in the US.

Table 1 ranks the top 10 normalised event losses (all perils now, not just meteorological) with the Newcastle earthquake and Tropical Cyclone Tracy topping the list with losses of around AUD$4 billion. Five distinct perils are represented in the top 10 losses. The reason that a repeat of the Newcastle earthquake is expected to cause a similar insured loss to a repeat of Tropical Cyclone Tracy (Table 1) is a direct result of the fact that no seismic building codes analogous to the wind loading prescriptions exist for the design of residential homes. Seismic risk is simply not treated seriously in Australia, a fact that is no doubt occasioned by the relatively low frequency of damaging earthquakes. The Newcastle experience, however, makes it clear that a modest earthquake in a built-up area can be expensive in terms of property losses and lives lost.

Figure 1: (b)

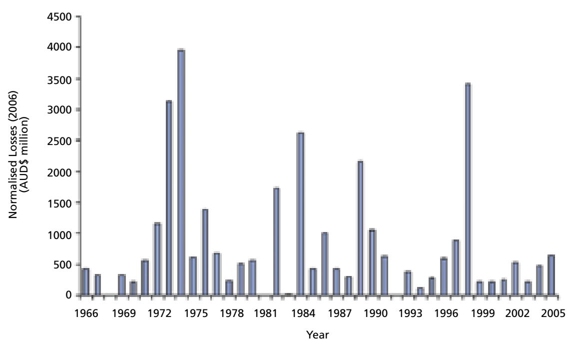


Table 1: Ten highest ranked insured event normalised losses. The current loss estimates the loss if the historical event was to recur in 2006.

Rank	Event	Year	Location	State	Original Loss (AUD$million)	Current Loss as at 2006 (AUD$million)
1	Earthquake	1989	Newcastle	NSW	862	4300
2	Tropical Cyclone Tracy	1974	Darwin	NT	200	3650
3	Hailstorm	1999	Sydney	NSW	1700	3300
4	Flood*	1974	Brisbane	QLD	68	2090
5	Hailstorm	1985	Brisbane	QLD	180	1710
6	Ash Wednesday Bushfires	1983	Multiple	VIC / SA	176	1630
7	Hailstorm	1990	Sydney	NSW	319	1470
8	Tropical Cyclone Madge	1973	Multiple	QLD / NT / WA	30	1150
9	Hailstorm	1976	Sydney	NSW	40	730
10	Hailstorm	1986	Sydney	NSW	104	710

*The 1974 Brisbane floods resulted from the degeneration of Tropical Cyclone Wanda.

Figure 2 classifies the weather-related normalised losses by hazard-type showing their contribution to relative event frequency and to the total normalised loss. Tropical cyclone and hailstorms together are responsible for 37% of the total number of events but over 60% of the total normalised loss. Conversely, thunderstorms account for nearly the same number of events, but only 11% of the total loss. Riverine flooding is potentially under-represented in this analysis because this peril has not been consistently insured.

Figure 2: Percentage of the number of and total normalised loss from all weather-related events in the normalised Disaster List by hazard-type. Event losses from hailstorms have been separated from other forms of thunderstorms (Crompton and McAneney, 2008)).

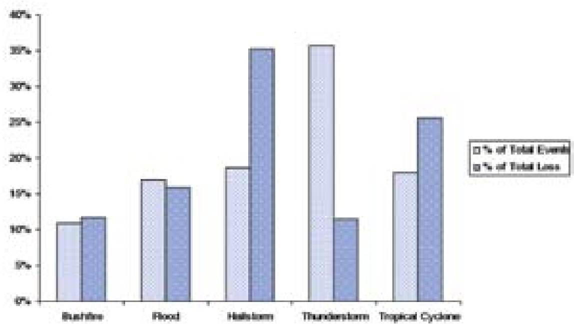
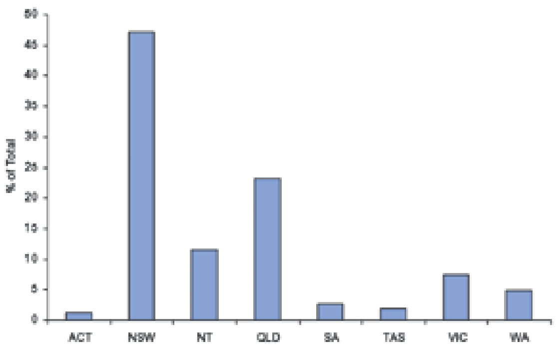


Figure 3 shows the contribution of the various states and territories to the average annual loss in current (2006) dollars of AUD$930 million[2]. This figure includes earthquake losses. New South Wales accounts for nearly half of this amount. Rapid development in other states may act to change this balance in the future.

Figure 3: Distribution by State and Territory of the national average annual normalised loss. Losses due to geological hazards have been included in this figure. (Data source: Crompton and McAneney (2008).)



Policy implications

The evidence reviewed here suggests that societal factors – dwelling numbers and values - are the predominant reasons for the increasing cost of insured losses due to natural disasters in Australia. There are simply more people and insured assets in vulnerable parts of the country. The impact of anthropogenic climate change on Australian insured losses is not detectable at this time. This being the case, it seems logical that in addition to reducing greenhouse gas emissions, significant investments be made to reduce our society's vulnerability to current and future extreme events, irrespective of how their frequency and intensity might change in the future.

We are aware of few disaster risk reduction policies explicitly developed to help Australian communities adapt to a changing climate, yet disaster risk reduction should be core to climate adaptation policies (Bouwer et al. 2007). Improvements in construction standards, as mentioned earlier, have seen dramatic reductions in wind-induced losses in Tropical Cyclones Winifred (1986) and Aivu (1989) (Walker, 1999) and most recently, Larry (2006) (Henderson et al. 2006, Guy Carpenter 2006). While wind code regulation was not introduced with adaptation to climate change in mind, it underlines the important gains that can be made and why there is a need to expand the role of disaster risk reduction.

The success of regulated wind-codes in reducing the vulnerability of residential homes in areas prone to tropical cyclones is an example of what can be achieved when there is a demonstrated need and political will.

2 Values in Figures 2 and 3 vary slightly from those given Crompton et al. (2008) due to ongoing refinements to the normalisation process and data sources.

Conclusions

We estimate average annual insured losses in Australia to be of the order of $1 billion in today's dollars and conclude that changing societal factors are the principal reasons underlying the increasing cost of natural disasters in this country. Despite the large cost, there is a positive message in this: Australia can, if it so chooses, control where and how people live and build. It is now relatively easy to identify homes vulnerable to threats such as tropical cyclone, hailstorm, bushfire, riverine flood, coastal flooding, etc. at least to an accuracy sufficient to underpin prudent policy decisions (Risk Frontiers Natural Hazard Profiles on-line: http://www.mapds.com.au/solutions_risk_frontiers.aspx; Chen and McAneney, 2005 and 2006). The success of improved wind loading code regulation shows what can be done where there is a demonstrated need and political will. Social governance of this kind in relation to other natural perils would result in immediate improvements in community resilience to both current and future climates. The choice is ours.

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About the authors

Risk Frontiers, Macquarie University, NSW 2109, Australia.

Ryan Crompton is Catastrophe Risk Scientist with Risk Frontiers and **John McAneney** is the Centre's Director. Risk Frontiers is a research centre devoted to helping insurers better understand and price natural catastrophe risks in the Asia Pacific Region. By performing research into the likelihood and costs of natural disasters, Risk Frontiers aims to assist the insurance industry in setting realistic premiums; build safer communities; and encourage the responsible management of natural hazard risks. It is sponsored by Aon Re, the Australian Reinsurance Pool Corporation, Benfield Australia, Guy Carpenter, IAG Insurance, QBE, Suncorp Group and Swiss Re (see: www.riskfrontiers.com).