# *Natural Hazards and Insurance*

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Insurance plays a significant role in spreading risk across communities and all sectors of the economy, over large geographical areas and time. The sharing and transfer of risk can assist the recovery to natural catastrophes and therefore enhance the resilience of society to disaster. This is becoming more important as the number of events and losses from natural hazards such as tropical cyclones, bushfires, hailstorms, flooding and earthquakes have increased over the last few decades. This chapter discusses natural hazards, the role of insurance in managing risk and the opportunity to be an active enabler and promoter of adapting to climate extremes.

There has been an increasing trend in the number of worldwide catastrophes from natural hazards over the last thirty years. Figure 1 shows this trend from 1980-2011 based on recorded annual overall losses, which include insured losses (Munich Re, 2012). The catastrophes in this figure are stratified into geophysical (earthquake, tsunami and volcanic eruption), meteorological (tropical and severe storms with hail and tornado), hydrological (flood, mass movement) and climatological events (extreme temperature, drought, forest fire). 2010 had the second highest number of catastrophes with 960 events. The ten year average is around 785 with the thirty year average being around 615 events per year. The number of events from extreme weather globally has almost tripled since 1980 compared to a factor around 2.5 for all loss events (including geophysical). Hydrological loss events have increased by a factor of more than three whereby meteorological loss events have more than doubled (Munich Re, 2011).

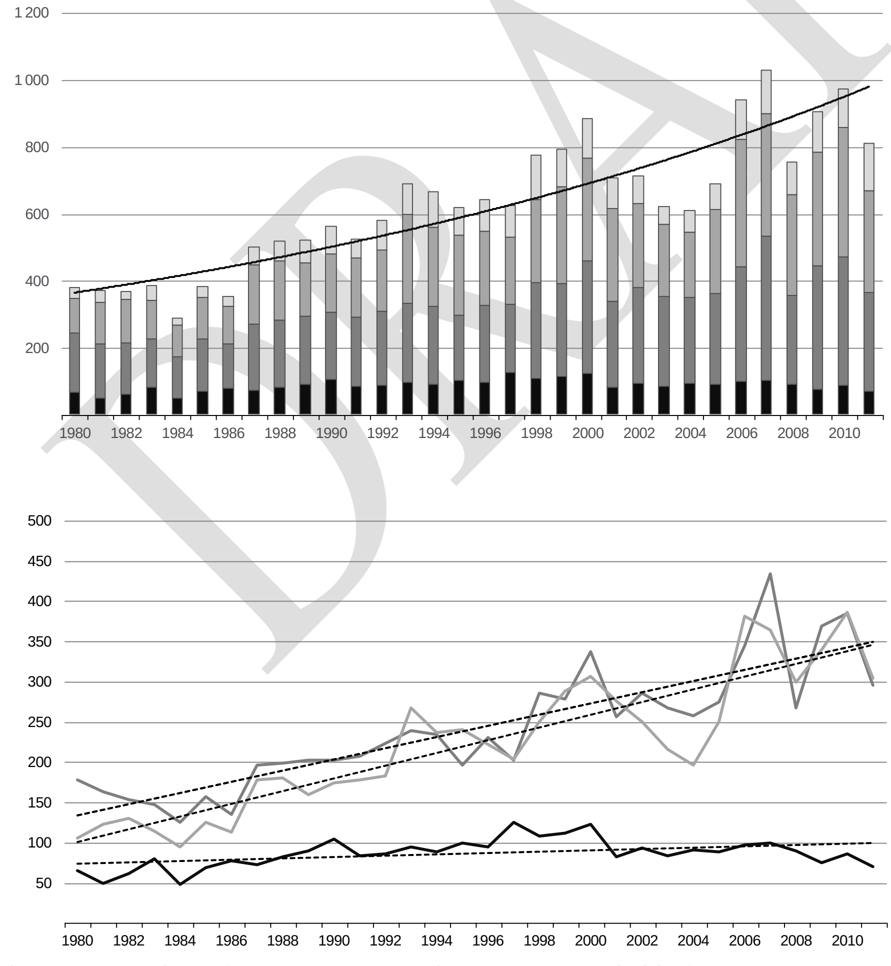


Figure 1: Number of natural catastrophe events worldwide from 1980-2011 stratified into geophysical events (earthquake, tsunami and volcanic eruption – black), meteorological events (tropical and severe storms with hail and tornado – dark grey), hydrological events (flood, mass movement – grey) and climatological events (extreme temperature, drought, forest fire – light grey) (Munich Re, 2012).



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In the Oceania Region, a significant increasing trend with large inter-annual variations is seen for damaging events (Figure 2), where damaging events are defined as those with fewer than 20 fatalities and considerable property damage up to AUD 55 million (Schuster, 2011). It is unlikely that geophysical events would have contributed to this trend, since losses and fatalities resulting from earthquakes are in general of a higher magnitude and are captured under the major catastrophe classification, which shows a slight increase only.

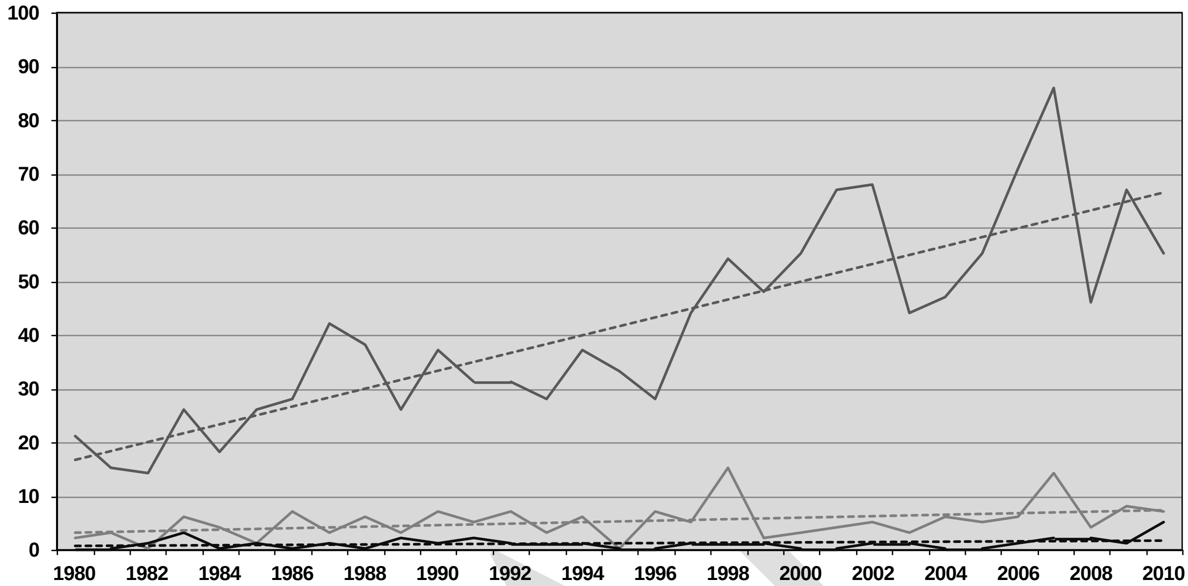


Figure 2: Annual number of natural catastrophes (weather-related and geophysical events) in the Oceania Region from 1980-2010 according to a catastrophe classification using data from Munich Re. The classification is based on overall losses (in 2010 values) and/or fatalities, with damaging events (fewer than 20 fatalities and/or considerable property damage up to AUD 55 million) denoted using a grey line, severe events (up to 500 fatalities and/or overall losses of up to AUD 550 million) marked with a light grey line and major catastrophes (over 500 fatalities and/or overall losses greater than AUD 550 million) using a black line (Schuster, 2011).

Since the number of geophysical events has increased only marginally compared to the atmospheric ones, and assuming that those events are exposed to the same drivers (socio economic and others) mentioned in the next sections, it could be inferred that the considerable rise in the number of weather related natural catastrophes cannot be entirely explained without climate change (Munich Re, 2011).

In terms of losses, Figure 3 indicates an increasing trend of overall and insured losses from weather-related disasters globally over the same period. The data is showing large spatial and inter-annual variations of major events (IPCC, 2012). Outstanding insured loss values can be seen in 1992 and 2005 from tropical cyclones Andrew and Katrina and 2008 from tropical cyclone Nargis, Ike and winter storms in Europe.

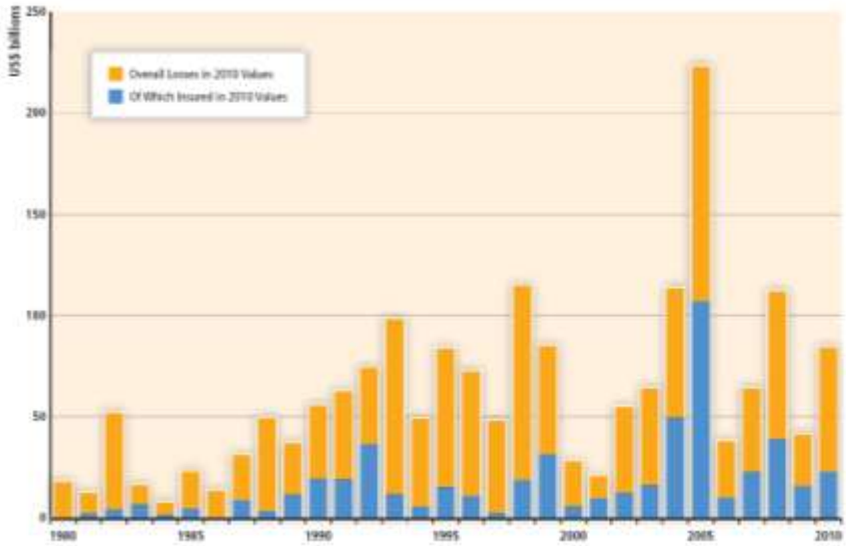


Figure 3: Overall and insured losses from weather-related disasters from 1980-2010 (in 2010 USD values, data from Munich Re) (Based on IPCC 2012: Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation, Figure 4-8, p.271). Displayed are events where the number of fatalities exceeds 500, hundreds of thousands people become homeless, the region's ability to help itself is clearly overtaxed with interregional and international assistance necessary and/or substantial economic losses in excess of USD 650 million.

Australian losses over the last 45 years have been dominated by severe storms (including hail) and tropical cyclones. Figure 4 shows the contribution to total insured costs caused by all natural hazards in Australia as: severe storms, including hail 42%; tropical cyclones 27%; floods 14%; bushfires 10% and earthquakes 7%. This distribution is based on their normalised insured losses from 1967-2011 (Insurance Council of Australia, 2012)

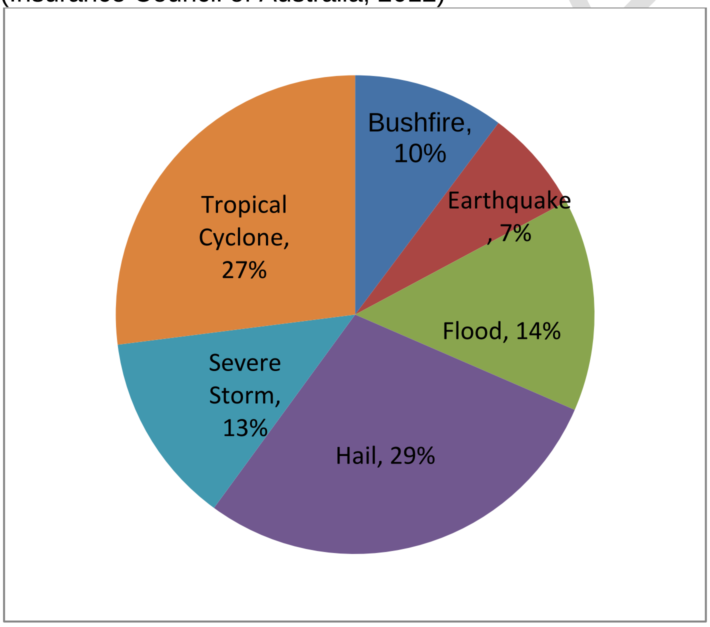


Figure 4: Percentage distribution of normalised insured losses from 1967 to 2010, based on the hazard.

Figure 5 shows the top 21 Australian natural catastrophes based on their normalised insured losses from 1967-2011 (Insurance Council of Australia, 2012). 20 out of the top 21 losses were caused by atmospheric hazards and a third of events were caused by hailstorms. This includes the April 1999 Sydney hailstorm with insured losses of approximately AUD 1.7 billion and total estimated economic costs of approximately AUD 2.3 billion (original dollar values as at 1999) (Schuster et al., 2005).

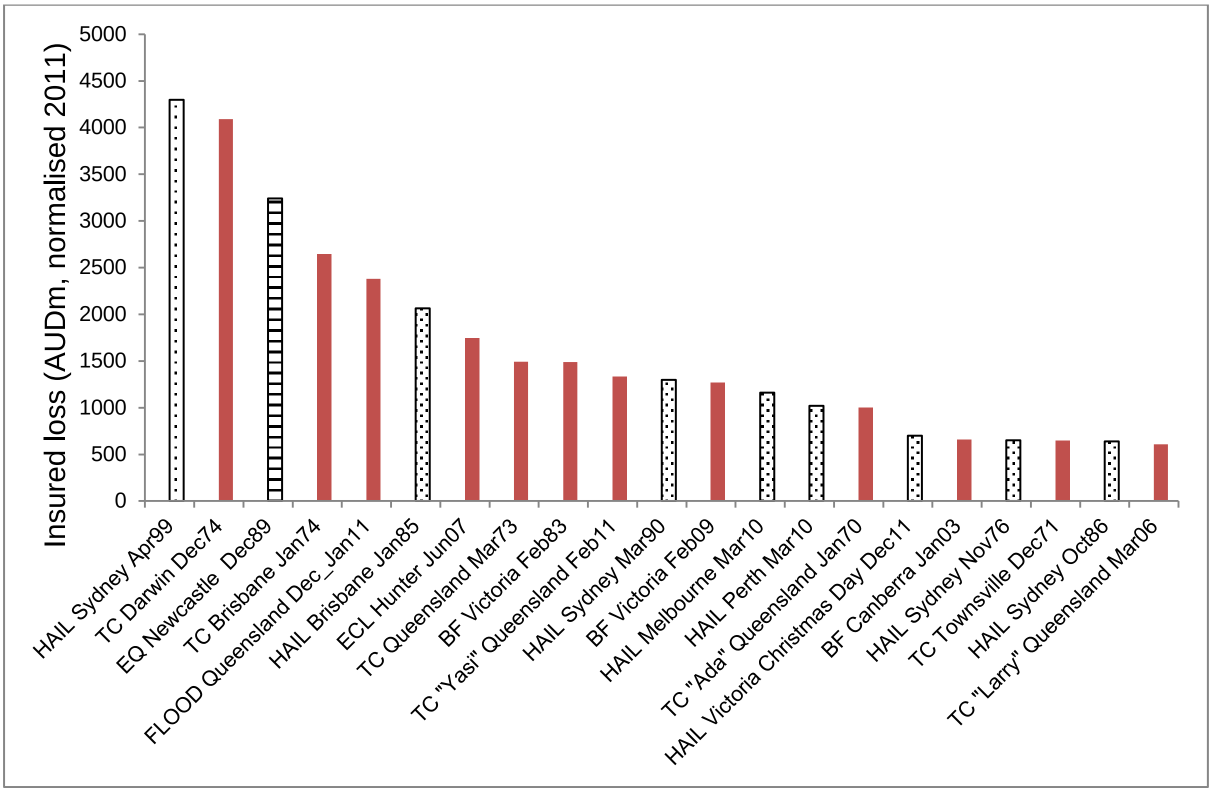


Figure 5: Top 21 natural catastrophes in Australia based on their normalised insured losses (1967-2011) using data from the Insurance Council of Australia.

The study of trends in long term loss records confronts a range of issues. The recent report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX) by the Intergovernmental Panel on Climate Change concluded, that there was no obvious evidence that climate change has led to increasing losses when disaster losses were adjusted for wealth and population increases, though climate change can also not be excluded (IPCC, 2012). Their conclusions are contingent upon data availability, quality, and record length but also on the assumptions and uncertainties surrounding the methods used to normalize loss data over time.

There are a variety of confounding factors that can be identified but resist quantification. For example, insurance density in a particular country or district can vary significantly and over time. In Australia, not all insurance companies participate in capturing loss information, resulting in some uncertainty in loss estimates. Additionally, approximately 7% of properties and approximately 28% of contents are currently un-insured (Sullivan, 2010). Particularly for industrial and commercial businesses, the indirect losses caused by impacts on key infrastructure, suppliers or customers (business interruption) can often be greater than the direct losses on buildings, stock and equipment, which is not covered in the data. The settlement and industrialisation of highly exposed regions is also a significant factor, such as in Surfers Paradise, South East Queensland (Australia) where the population has increased from around 33,700 in 1961 to around 507,500 in 2006. The concentration of population and values in urban centers and megacities as well as an increased vulnerability of modern society and technology to natural hazards is another contributor. In addition to the physical damage, the social cost of disasters is hard to quantify and not readily available.

There are also some factors that can act to reduce vulnerability and losses over time. They include, amongst others, improvements in emergency management, forecasts and warnings. For example higher numbers of volunteerism in disaster prevention, preparedness, response and recovery has led to increased resilience to natural hazards. Changes in urban and land use planning and the way, in which the built environment is constructed taking into account current hazards and projections during its lifetime can also reduce losses. Historically, Australian building code standards have had a priority on the protection of life and safety. The increasing trend of natural catastrophes has put a greater focus on enhancing the resilience of the property to natural hazards. Current initiatives by the Australian Building Codes Board are considering changes to construction codes for bushfire and cyclone affected areas. They are also assessing what role building standards may play in flood-prone areas. One potentially useful approach could be to develop a resilience rating given to buildings, similar to the star ratings systems used for energy efficiency and water use (Edge Environment, 2011). If resilience ratings were widely in use, the insurance industry could offer lower premiums to those people in more resilient buildings, hence providing a financial incentive for individuals (Geneva Reports, 2009, Insurance Australia Group, 2011). Insurers can also provide economic incentives to discourage, for instance, construction in high risk areas (Geneva Reports, 2012).

In general, insurance cover in Australia is now available for all major natural hazards. Riverine flooding causes an average of AUD 400 - 450 million in damages per year (Insurance Council of Australia, 2011). The cost of the December / January 2011 flooding events is estimated in excess of AUD 5 billion by the Queensland Reconstruction Authority (Queensland Government, 2011) of which half was due to damaged roads and infrastructure. Residential insurance for riverine flooding was not readily available in the whole of Australia until a few years ago, which is reflected in the loss percentages in Figure 4. Currently, market provision of flood cover is accelerating with over 50% of policies selected by consumers providing some sort of cover. This is expected to exceed 85% by the end of 2012. Even though, a large proportion of policies will have flood cover, it is estimated, that only about 7% of residential properties in Australia are exposed to predictable and repetitive riverine flooding. This highlights the issue of cross-subsidised premiums relative to risk. Additionally, a large proportion of the 15% of policies without cover for riverine flooding will be those most exposed to flood risk. If flood cover would be available, affordability is likely to be a key issue due to higher premiums. This will lead to increased levels of under-insurance and non-insurance (Institute of Actuaries of Australia, 2011), exacerbating the vulnerability of individuals and business and putting pressure on governments. It also raises the issue regarding the feasibility of maintaining insurance cover in highly exposed regions. Insurance companies can increase premiums and deductibles, lower the limits and impose broader coverage restrictions, but with significant risks to their business model in balancing profitability and long-term affordability without risking diminishing markets, margins and reputation (Climate Risk, 2008).

Flood risk can be reduced through having a better understanding of the risk of flooding through national flood risk mapping. Adaptation options include an adoption of a minimum floor height and structural requirements for properties at risk; investments in soft and hard protection like flood barriers, dykes, pumps and retention works and providing an appropriate distance from the hazard. Relocation and then land buyback or land-swap is a last resort and was initiated by the local government responsible for Grantham (Queensland) (Lockyer Valley Regional Council, 2011) and previously successfully implemented near Bathurst in the late 1990s (Bureau of Transport and Regional Economics, 2002). Also, improving the household understanding of individual flood risk by the provision of freely available information on the risk is important.

With regard to coastal settlements, around 200,000 residential buildings (valued around AUD 60 billion) and around 7000 commercial buildings (valued around AUD 70 billion) are exposed to inundation and erosion at a sea level rise of 1.1m such as might occur under a high end scenario for 2100 (Department of Climate Change and Energy Efficiency, 2011). Damage to port infrastructure could be very large. Exports worth 43 billion were bulk-shipped from ports in 2007 (Department of Climate Change, 2009). Yet, there is no widespread commercially available insurance cover for gradual sea level rise and coastal erosion available. However storm or tidal surge is now increasingly being covered.

Insurance has been described as the world's major buffer of risk. It can play a role in providing risk sharing and risk transfer mechanisms to enhance the disaster resilience of society to changing climatic extremes. These mechanisms comprise natural catastrophe micro-insurance and insurance on a local scale, global reinsurance and national, regional and global risk pools (IPCC, 2012). Initiatives which aim to establish risk transfer systems in countries vulnerable to climatic extremes are being developed and implemented. Financial relief, recovery and reconstruction of livelihoods, and the resulting reduced vulnerability are provided though these mechanisms, which are linked to disaster risk reduction and climate change adaptation. The provision of knowledge of the risk and incentives to reduce it may also be provided (IPCC, 2012).

Insurance can also act as a barrier to adaptation. Typical insurance policies replace like with like and a damaged building would be repaired to the same vulnerability level it had before the event, keeping the risk at a similar level instead of reducing it. If the property was non-compliant before the event due its age of construction, the re-build would need to meet new design criteria and this would be a clear adaptation benefit. However damage due to natural hazards is mostly a case of repair (with the exception of bushfires) and total losses are generally not common. An economically viable mechanism needs to be developed to encourage repairs to a more resilient level, and could include co-contribution from government or tax offsets on top of insurance payouts (Insurance Australia Group, 2011). Still, without adaptive measures, uncertainties surrounding the projected increases in extreme events will see insurance premiums rise, with increasing exclusions of cover and non-coverage in certain areas (Insurance Australia Group, 2011).

With the increasing trend seen in natural catastrophes and climate extremes, the insurance industry is uniquely placed to play a strong role in providing risk management and enhancing the resilience of communities. This is an opportunity to not only spread risk but also to assist in adapting to a changing climate. There is still work to be done in ensuring that insurance cover in exposed areas is both equitable and accessible and that insurance does not provide barriers to adaptation. However, the nature and challenge of climate change and natural catastrophes cannot be covered by the insurance industry alone. Disaster risk can be reduced through a better collaboration and cooperation between governments, industry and insurers to ease the economic, social and human impact (Geneva Reports, 2012).

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