Never underestimate troubled water

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Flood is probably the natural peril Australia is most aware of. Major floods frequently isolate towns, create major disruptions to road and rail links, and can cause many fatalities. Widespread damage to houses and business premises as well as losses in agriculture are common. Practically every year there are flood losses, sometimes with devastating consequences.

#Flood events in Australia can be mitigated but never prevented. Politics and insurance need to partner closely #climate change, #mitigation

Despite regular loss events, the consequences of flooding are still often underestimated – both in Australia and around the world. One reason for this is that almost no one expects the unexpected, even if it happens often, as is the case with this phenomenon. Floods, in particular the flash floods common in Australia, can happen anywhere – also in extremely dry regions. This element of surprise makes these events even more dangerous than they would otherwise already be.

Flood appears controllable

People tend to be less frightened of floods than of other natural hazards. Unlike earthquakes, for example, it is assumed that a flood can be controlled by appropriate measures. Most people think that when a flood happens, they will still be able to barricade themselves in or escape safely with their belongings. Precautionary measures taken by the authorities, such as storm and flood warnings or flood control structures, also give people a sense of security.

But experience shows: extreme events can neither be entirely prevented, nor can they be completely controlled. Their frequency is likely to increase as climate change progresses.

Varying risk

Even if nowhere is entirely safe from flooding, the risk varies greatly from region to region in Australia. Major loss occurrences are to be expected in Queensland and along the entire east of the country. The costliest flood of recent times hit Brisbane – although the city appeared to be very well protected by two large dams. It would be false to believe that the water level of 4.56 m in January 2011 was the worst case that can be expected. In the past, Brisbane has experienced much higher flood levels (e.g. 8.35 m in 1893 and 5.45 m in 1974). The Wivenhoe and Somerset dams cannot offer any guarantee that these levels will not be reached again.

While it is mainly tropical cyclones that bring huge volumes of rain to Queensland, in New South Wales it is the East Coast Lows that bring high wind speeds and copious rainfall. Australia has suffered a lot in this region, and has taken great steps to mitigate the consequences from future events, but they cannot be totally prevented.

Along the entire northern and western coasts of Australia, from Brisbane to Perth, tropical cyclones with their enormous amounts of precipitation can occur and cause flash flooding. Large-scale floods and losses in the billions are most likely in the densely populated area of Perth, should a cyclone hit at full force.

The biggest floods since 2005

Flood periods	Affected region(s)	Overall losses (A$)	Insured losses (A$)
January to February 2008	Northeastern Australia, especially Queensland	2.2bn	1.5bn
December 2010 to January 2011	Eastern and northeastern Australia: incl. the Brisbane flood and the Toowoomba/ Lockyer Valley flash floods;	6.8bn	2.4bn
January 2013	Northeastern Australia	2.2bn	1.1bn

All losses given in original values at the times of the events

Source: Munich Re NatCatSERVICE

There can even be flooding in the arid middle of Australia, although this is rare, invariably very localised and of little economic consequence given the low concentration of values involved. For example, in January 2015 more than 200 mm of rain fell in the space of just a few days in Alice Springs. Several buildings were flooded and one person drowned.

Short rivers

Apart from the Murray-Darling basin, there is no major river system in Australia. That is why river floods often behave in a similar way to flash floods, providing little or no advance warning. The flood wave in the Brisbane River in 2011 also rose very rapidly. Similar events are possible on nearly all Australian rivers, because they generally run a short route to the sea and have very few tributaries, allowing flood waves to approach quickly and suddenly. The usual feature of river flood remains: flooding caused by the overflowing of a river (in contrast to local rainfall flooding). Hazard zoning and flood protection are therefore highly relevant aspects.

Risk on the beach

Most coastal regions of Australia are exposed to the risk of storm surges. On the east coast they can arise in connection with East Coast Lows, and on the northeast, north and west coasts as a result of cyclones. The fact that Australian cities have largely escaped storm surge catastrophes to date does not mean that it will stay that way. It is precisely this lack of negative past experience that has led to highly exposed building developments near beaches. An unfavourable storm constellation could easily put large parts of cities like Brisbane, Cairns, Darwin or Perth under water, triggering unprecedented losses there. On Australia's northern coast, storm surges can be higher than almost anywhere else on the planet. In 1887, a storm surge swamped the city of Burketown, 30 km inland from the Gulf of Carpentaria. The water level was about 5.5 m higher than the highest-ever mark recorded during a spring tide. In 1923, a 6.5 m water level was even measured on Groote Eylandt in the Gulf itself. The highest combined storm surge and wave action ever to hit Australia was during Cyclone Mahina, which struck Bathurst Bay in March 1899 and claimed over 400 lives. The ultimate high-water line was estimated to be 14.6 m – still claimed by some to be the world record.

Building resilience

The enormous economic and financial losses caused by floods are a considerable burden for Australia. That is why it has put a lot of effort into containing the risk in recent years. Four components of prevention are of key significance:

1.
Flood prevention is designed to prevent dangerous floods from occurring, or at least to make it more difficult for them to occur (measures such as forestation or removing impermeable surfaces in the catchment area to increase local water storage).

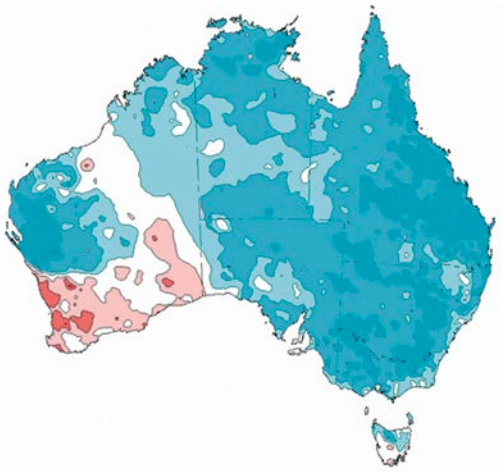
2.
Flood control is supposed to prevent high-value areas from being flooded (e.g. dykes, detention basins, dams).

3.
Loss mitigation limits the material losses if the flooding of a building cannot be prevented (e.g. flood-proofing, evacuation).

4.
Financial protection – usually in the form of an insurance policy – protects against financial ruin, enables immediate reconstruction and is a key factor in managing risk and building high resilience.

The lack of warning and time to react and the very limited options available for structural flood prevention and control in the case of flash flood events make loss mitigation almost impossible and insurance particularly important. Flash floods generally impact the immediate area close to where they arise, which makes them difficult to fully prevent, control and mitigate against. However, flood-proofing of buildings can effectively reduce the consequences of moderate flash flood events.

Rainfall deciles for October to December 2010



Decile

	Highest value on record
10	Very much above average
8–9	Above average
4–7	Average
2–3	Below average
1	Very much below average
	Lowest value on record

Deciles represent a ranking. Oct.–Dec. 2010 rainfall in decile 10 means that it belongs to the top 10% of all historically recorded Oct.–Dec. rainfall depths. Decile 1 means it was within the lowest 10%.

Source: Bureau of Meteorology, Australia

A prudent, affordable and sustainable development of flood plains and coastal areas calls for risk-based flood control. To clarify: the protective measures taken are always based on what is called a "design flood". The protection is then designed to be effective up to that high-water level. Here, irrespective of what the region is used for, a standard protection objective is often pursued, for example a 100-year return period. But it does not make sense to subject all regions to the same flood probability. Risk-based flood protection minimises the overall risk much more efficiently. Many countries have already started rethinking their approach here. Munich Re supports this re-evaluation process and provides the required local risk knowledge about the development of natural hazards, for instance with NATHAN Risk Suite.

Government and insurers need to work together

There is a wide range of products providing flood cover available in Australia. The insurance ratio also seems reassuring at first glance: around 90% of insured homeowners (77% of all) have flood cover for building and/or contents. But upon closer consideration, it becomes apparent that most of the homeowners in high-risk areas do not have flood cover. In New South Wales, only 2% of these areas have full flood cover. In Queensland, the figure is 5%. The reasons are easy to understand: for an average house in these areas, the premium for flood insurance alone can be between A$ 10,000 and A$ 20,000. By comparison, in Queensland the average premium for all other perils together is in the order of A$ 1,000.

Australia is not the only country that struggles to make the flood risk in highly vulnerable areas insurable. The insurance industry cannot solve this problem on its own; it needs to be addressed by governments, insureds and other stakeholders. Once the concept of total risk is understood, then prevention and control measures can be used to mitigate the risk. Insurance can be further used to minimise the residual risk. In this regard, as insurers calculate premiums that are commensurate with the risk, mitigation would have a positive impact on pricing, and potentially on penetration of flood coverage. The frequently used option of "disaster relief", or swift financial aid after catastrophes, is no alternative. It rewards those who have not taken precautions, thus undermining all efforts to protect against risk and losses. Much more preferable would be financial incentives from the state and local governments to invest in mitigation and protection activities, so that everyone can afford cover, and so that the insurance industry can develop suitable products. Putting pressure on insurers to bear the risks on their own through discounted premiums that do not cover costs would distort the market and probably prompt some providers to withdraw entirely.

Conclusion

The natural peril "flood" and its potential consequences can be significantly reduced by taking the right measures, but there will never be complete protection against it. So it is all the more important not to underestimate the danger – especially of flash floods. Because at the end of the day, an insurance policy is the only reliable way of at least making a new beginning possible in the event of a loss or personal catastrophe. All homeowners, companies and communities should be aware of this. The insurance industry can do its bit by educating clients, giving them helpful tips on how to deal effectively with the risk, and providing comprehensive support.

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What is a return period?

A return period is the inverse value of the exceedance probability and indicates the *average* time between events of the same intensity. Hence, there is a 1% (1/100) chance of an event with a 100-year return period being equalled or exceeded in any given year. This does not permit any forecast to be made about the next event. If a flood protection structure is built on the basis of a 100-year design flood, it (theoretically) does not offer protection against a 150-year event.

Flood volumes are huge

In January 2011, the peak flow rate in the Brisbane River at the Brisbane Port Office was 12,400 m^3/s. If you were to take half of this flow and direct it onto a rugby field of about 10,000 m^2 (140 x 70 m), the field would be submerged under 37 metres of water in just one minute. The flow rate remaining in the river (6,200 m^3/s) would still represent a flood the likes of which only occurs every 20 years on average.