INTRODUCTION

Following the Brisbane floods and Cyclone Tracy in the early 1970s, the Commonwealth government agreed in principle to a national natural disasters insurance scheme. The idea was abandoned in 1979 by the then-Treasurer, John Howard, for reasons including:

…that the scheme would be inappropriate on budgetary, technical and insurance grounds…

and

…that such a scheme would be inconsistent with a basic tenet in [the government’s] political philosophy – namely that governments and government authorities should…avoid intervention in matters that can be left to the private sector. (Howard, 1979, iii)

Governments have come and gone since then but the ‘hands-off’ approach remains and there is still no nationally uniform approach to natural disasters insurance. More specifically, cover from commercial insurance companies has been incomplete as, until recently, most companies have excluded cover for riverine flood for residential properties. Over the last thirty or so years there have been numerous conferences, insurance industry working groups, two national workshops and much hand-wringing and little action. Over this time many policyholders have found out the hard way that the fine-print of their policy disclosure statements (PDS’s to those in the know) exclude some types of flood damage. Much money has been spent paying lawyers and consultant hydrologists to argue about whether damage to a particular property was due to flood water or storm water. Inconsistent definitions and approaches between companies have often left the insurance industry as a whole looking less than on-the-ball after a severe flood and made it an easy target for politicians and shock-jocks. Probably most important of all, flood insurance has not been able to play a significant, and legitimate, role as a tool in floodplain management and disaster risk reduction.

RECENT DEVELOPMENTS

In December 2003, the Council of Australian Governments (COAG) gave in-principle approval to the recommendations of the report Natural Disasters in Australia: Reforming Mitigation, Relief and Recovery (COAG 2004). Two salient recommendations were:

Recommendation 65:
That COAG endorse the following statement of the desired role of the insurance industry: Insurers have a responsibility to offer effective cover for natural disasters encompassing all hazards for households and businesses at fair and competitive premiums.

Recommendation 66:
That the insurance industry should take active steps to…Avail themselves of the proposed new access to State, Territory and Local Government information on flood risk and accept that insurers’ special needs for data on risk are a matter for insurers to address collectively.
The recommendations were the catalyst for considerable research and activity by the general insurance industry on the issue of flood mitigation and management. This included a national assessment of flood risk to residential properties, quantification of the cost of potential national residential property losses, investigation of coastal inundation exposures and finally the development of options for flood coverage through joint government/industry pools or through cross subsidisation or community rating of the flood risk across all policies.

Liaison with Federal and State governments at the time revealed a strong preference for risk rating of the flood risk at property level, with several key decision makers indicating a strong distaste for policyholders with no flood risk subsidising the insurance premiums of ‘waterfront property owners’.

The general insurance industry, through the Insurance Council of Australia, then set out to i) improve community understanding by developing consistent definitions of flood (as it relates to insurance); and ii) provide an environment where underwriters can access datasets that would enable property by property assessment of known flood risks.

The first part of this project involved applying to the Australian Consumer and Competition Commission (ACCC) for the industry to adopt a common definition for flooding, to reduce consumer confusion over the current multiplicity of available definitions, and to allow product comparison by consumers. Consumer aid groups ultimately objected on the grounds that a common definition would not serve the community well and the ACCC subsequently did not approve the adoption of a common definition. As a consequence, insurance policies today offer a wide variability in the definition of flooding and it is up to consumer to interpret, understand and compare all of the different options.

The second part of the project has been more successful. Insurance Council members have collectively contributed a significant financial sum to the creation of the National Flood Information Database (NFID) through the aggregation of all available government flood mapping. Each State Government agreed to participate by providing free access to ‘available’ flood mapping sources in return for a free copy of the completed NFID. A critical factor in choosing to rely upon existing government flood mapping, rather than producing new flood exposure maps using the latest technology, is that customers must be able to accurately reference an authoritative source of mapped risk and this should remain a government service/responsibility to the community.

Each State has responded differently to the need to provide flood exposure mapping, depending on their individual internal and legislative arrangements for management of the risk. Several States were able to provide immediate and full electronic access to all existing local government and authority flood mapping. Other States, whilst willing, have been unable to coordinate a comprehensive response and in these cases work-arounds or comparable datasets have been necessarily sourced.

The final result has been the production of a dataset that, as it grows, will enable continued insurance product development and pricing for all but the most high risk of properties. Those properties at extreme risk of flooding will (and do) have flood insurance options, however the majority of these options reflect, in terms of cost, the extreme risk.

More flood data being introduced into the NFID, including progressively better data as local government or authorities improve their existing datasets, will enable the general insurance industry to better calibrate products being offered and allow the community to have the choice to protect themselves against this risk. Where a local government or authority undertakes new flood mitigation work that changes the flood behaviour in
relation to a community, it is critically important that new flood mapping showing the improvements can be incorporated through the relevant State government into the NFID – if such changes are captured, the community will see a direct reflection of government mitigation works in the household cost of an insurance premium.

**FLOOD INSURANCE DATA REQUIREMENTS**

Flood is a peril where the risk is ‘binary’; that is a location is either in a flood zone, or it is not. There are of course variations in the frequency with which a location in a flood zone can be affected (for each by a 20 year or a 100 year return period flood) but a flood extent can be defined with an acceptable degree of certainty as a distinct geographical area. Some properties (in fact most) are not at any level of flood risk. In contrast, for other insured perils such as storm or earthquake some properties may be at higher risk than others, but there is still a risk to all locations.

Insurers therefore require higher resolution and better quality risk data to cover flood than is required for other perils.

Historically, flood cover has been limited in its availability in Australia. However, this is not because flood, as a peril, is uninsurable; flood cover is included in the standard home (fire) policy in numerous other countries - two notable examples are New Zealand and the UK.

The information that insurers need to quantify flood risk, to price for it as a component of their insurance policies and to monitor their portfolio can be summarised as:

- Location of properties at risk
- Frequency with which they are affected (i.e. a return period)
- Severity of flood (often determined as a depth of flood water)
- Potential for multiple locations to be affected by a single, or series of events in a short timeframe

**THE NATIONAL FLOOD INFORMATION DATABASE (NFID)**

NFID was developed by Risk Frontiers Flood Australia Pty Limited and Willis Re Australia for the Insurance Council of Australia as part of the second stage of the project mentioned above. The product was developed specifically for insurance underwriting applications and will be licensed only to Insurance Council members. The NFID is fundamentally a database of flood risk information at street address resolution that will allow Insurance Council members to test the flood risk applicable to an insured’s property and then offer flood insurance at an actuarially calculated price.

NFID will be delivered in several stages. The initial NFID contains flood risk information for approximately 1.4 million addresses in NSW, Queensland, Victoria and Tasmania. This was released in late 2008. Coverage will be expanded over the next two years with the priority being other highly populated areas with concentrations of flood risk. An ongoing maintenance program for the NFID will be undertaken with regular updates that incorporate changes in property exposures, new and revised flood information and improved terrain datasets.

For the purposes of the NFID, the term ‘flood’ has been defined as the overflow from a natural watercourse. This does not include:

- Overland flow resulting from back-up or failure of urban drainage systems (such as subterranean pipes or drains); or
- Storm surge associated with meteorological events, such as cyclone, extra-tropical cyclone or low pressure systems.
Methodology

NFID is derived from the best quality available data (that is, flood modelling/mapping information, Digital Terrain Models, and address location data). No hydrological or hydraulic flow modelling is undertake; in this respect the starting point is the output of modelling by specialist flood modelling consultants in the form of maps, flood study reports etc. The flood data is processed and combined with DTMs and geolocated address data to estimate flood risk for each address point.

The two key flood risk measures in NFID are:
- The probability of flooding over the ground (and 1m and 2m above ground) at each address point, and
- The water depth at each address point for fixed probability ‘design’ floods (ARI 20y, 50y, 100y and extreme).

The probability of flooding is expressed as Average Recurrence Interval (ARI). The ARI measure provides a ready estimate of the location of the address compared to design flood water heights. For example, an address with an ARI of 61 years tells us that the ground level of the address is between the level of the ARI 50-year flood and the ARI 100-year flood. Addresses that have ground levels below the level of the ARI 20-year flood are given an ARI of 19 years. Those located above the level of the extreme flood are nominally given an ARI of 10,001 – and are assumed to be flood-free.

Figure 1 illustrates the processes involved in developing the NFID. The two key processes are:
- The hydraulic process, which involves constructing water surfaces based on available information.
- The mapping process, which involves linking flood and ground elevation information to the property addresses.

The amount of work in the first stage depends on the quality and format of the input flood information – the process can cope with most formats from hardcopy river profiles to the more ideal case of flood surfaces in GIS format provided directly by the relevant agency or authority.

The flood surfaces for ‘design’ ARIs are combined with elevation data to produce water depths for each return period. These depth surfaces are then overlayed with G-NAF addresses in order to assign a depth of water to each address.
Caveats and data issues

Flood risk information in the NFID (including depth information and the probability of flooding) is subject to uncertainty associated with the underlying flood modelling, DTMs, fitting of flood surfaces and the G-NAF point location on a parcel of land. The product is therefore best suited to identifying properties that can then be grouped into flood risk bands, rather than for quantifying incremental differences in flood risk between individual properties. This accords with most insurance applications (see below). The sources of uncertainty are made explicit to the licencees and include at least those noted below. As better quality becomes available the quality of NFID will increase.

- G-NAF represents addresses as single points at the centroid of the land parcel. Thus there may be cases where there is partial flooding of a land parcel not identified in the analysis because the centroid falls outside the flood extent.

- The terrain elevation data used for the analyses was derived from data held by various state government departments and local government authorities. The accuracy of the DTM’s created from this data may vary considerably. Any
inaccuracies with the elevation data will affect the accuracy of the resultant water depths and ARIs derived during the calculations.

- NFID only contains information pertaining to the risk of riverine/mainstream bankfull flooding. The risk of flash flooding, drainage surcharge, or coastal inundation from storm surge or sea level rise is not considered.
- Although flood flow velocity can have an important influence on building damage, the NFID does not utilise, nor does it purport to give any indication of, flood flow velocity information.

The effect of flood defences is incorporated into modelled flood depths and flood ARIs for all addresses where levees are present and sufficient data are available. It is assumed that such defences function as designed.

The NFID does not purport to describe the risk of inundation over the floors of the relevant residential property, but rather is based on predetermined elevations above ground level (being 0m - ground level, 1m and 2m).

HOW WILL INSURANCE COMPANIES USE NFID?

Over recent years flood insurance has become more available to policy holders in Australia. This initially occurred through a change in definitions to allow cover more storm and water damage, but also more recently by an extension of coverage of riverine flood for residential insurance. At least two major insurers in Australia have extended their natural perils coverage to explicitly include flood damage in the past year.

There are two main ways that insurers will look to use the NFID information: i) to manage their portfolio exposure to flood risk, and ii) to help transfer of catastrophe risk via reinsurance.

Insurers look to offer a product to policy holders that is based on the acceptance of risk in exchange for a premium. The risk needs to be quantified for an insurer to be able to ensure they are charging a premium commensurate with the risk. In the case of a motor vehicle policy they judge the risk based on factors such as age of driver and engine size; for a home policy factors include the crime rates in the locality or susceptibility to natural peril risks such as tropical cyclones, bushfires or floods.

Insurers collate information on their portfolios to ensure they understand the exposure they have to various natural perils. They clearly need to quantify their risk and determine how exposed they are to a potential natural peril event – and how much they could need to pay out in the event of a major flood. Of course, they also wish to understand how much of the overall market risk they are insuring – are they over-, or under-exposed to flood risk based on their market share?

This in turn leads to the financial protection which insurers purchase. The Australian Prudential and Regulatory Authority (APRA) require insurers to ascertain their potential exposure to catastrophe risk and report on this by way of a Maximum Event Retention. Flood should be considered as one of those potential catastrophes and the concentration in an area of risk considered.

*Insurers are exposed to the possibility of very large losses arising from their portfolios as a result of various natural catastrophes or other causes of large losses e.g. earthquakes, fires, storms etc. These catastrophic events will occur only rarely and yet their financial impact on an insurer can be very significant, possibly even resulting in the failure of an insurer.* (APRA 2005)
Insurers also purchase reinsurance to provide them with financial support in the event of a major disaster. For example, most insurers claimed from reinsurers after the Black Saturday Bushfires in February 2009. Insurers have to pay a premium for this reinsurance protection and this is set based on the level of risk to which they are exposed. Reinsurers are asking insurers what their exposure is to flood risk and insurers are using NFID to assist them in this process.

NFID is the first time a consistent, coherent and national approach has been taken to mapping flood risk for insurers. This should be seen as a key building block in the process insurers should taking to managing flood risk. It does not have all the answers to all the questions on flood and more detailed and more comprehensive mapping will become available as the database is developed. In its current incarnation it is a key reference point for insurers and a starting point for the industry in quantifying and managing flood risks.

TAKE HOME MESSAGES

- Flood insurance for residential properties has not been generally available in Australia – primarily because insurers believed that there were insufficient flood risk data available to allow them to price, and hence provide, residential flood cover.
- The National Flood Information Database (NFID) is an initiative of the Insurance Council of Australia that goes a long way towards solving this problem by collating flood risk information in a single database in a format that insurance companies can use to price the risk.
- Because of NFID flood insurance will become much more readily available.
- NFID is derived from existing flood risk information and terrain data provided by either state or local government. No new hydrological or hydraulic modelling has been carried out so there has been no duplication of effort.
- NFID has high level support within both Commonwealth and State governments.
- NFID is a work-in-progress, the quality of the product will improve over time will improve as better quality data becomes available and is integrated.
- Readily available flood insurance for residential home and contents will increase the resilience of Australian communities to the impacts of flooding.
- Individual insurance companies will no longer have to approach local government authorities with (repetitive) requests for flood data.
- Flood insurance claims will be settled more quickly as there will be no need for expensive hydrologists and lawyers to argue the question: “was the cause of the damage to a particular property the result of an insured or excluded peril for the particular insurance policy”.

REFERENCES


Council of Australian Governments 2002, Natural Disasters in Australia: Reforming mitigation, relief and recovery arrangements, a report to the Council of Australian Governments by a high level officials’ group, August 2002, Department of Transport and Regional Services.

Howard J. (Commonwealth Treasurer) 1979, National disaster insurance (a policy information paper issued by the Treasurer). AGPS, Canberra.