A Flood or Not a Flood – The Insurance Conundrum

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ABSTRACT
The late 1990s Wollongong floods fielded a wakeup call for the insurance industry. Public outcry over the fine line between storm and flood led to a large number of ex-gratia payments to placate the concerns. The subsequent dry period on the east coast provided time for consideration into how best to address this issue, and with natural disasters world wide not abating, the re-insurance industry increased its pressure on the commercial insurers.

Up to this point insurance policies had a seemingly clear distinction between flood and storm, however in the public’s eye this distinction was seen as somewhat subtle and in-distinctive. A subsequent court ruling further emphasised the need for insurers to clarify their definition of flood in layman’s terms. These occurrences have led to a variety of outcomes from covering flood, to covering flash flood, to strengthening the old policy wording.

The challenge of distinguishing between storm or flash flood and flood has been attempted through a review of the driving meteorological mechanisms in relation to the size and location of stream catchments. The objective has been to identify a classification system that will distinguish a range of outcomes across the scale of storm events and stream systems.

The classification system enables an explicit distinction to be made across the spectrum from direct storm effects through flash flooding to mainstream flooding. The scale facilitates the classification of a storm event across all affected catchments as well as at specific sites, and has been a distinctive aid in assessing overall storm behaviour and insurance claims.

INTRODUCTION
The August 1998 Wollongong flooding fielded a wakeup call for the insurance industry in Australia.

“Community pressure over the whole flood insurance issue has been building for several years. It came to a head in Wollongong through a concerted media campaign, political interest and, most importantly, a united community.” [3]

“The homeowners are appealing against insurance company assessments which ruled the homes were damaged by flood water – not covered in the policies – instead of storm water, which is covered.” [6]

“I am surprised that insurers have not clearly resolved the issue of confusion between storm and flood, Mr Steffey (GIO CEO) said. This amounts to a public repudiation of the position of the Insurance Council of Australia, which has insisted that flood insurance would be too expensive and too difficult.” [5]
The fallout in Wollongong was payment of many of the claims as either ex-gratia payments or revisions to the flood exclusion clause providing partial cover. In all some 500 claims were settled at a cost to insurers of $40M.

The relatively dry decade in NSW since then put the issue somewhat into abeyance until the devastating flooding throughout Newcastle and the Central Coast in June 2007 again highlighted the issue of storm vs flood. With the adverse publicity from the Wollongong flooding still relevant “…NRMA Insurance scored a public relations coup in the first few days after the Hunter storms of June 2007 when it established caravan claims centres and announced that it would cover all damage. Some other insurance companies were beginning to quibble about whether water damage caused by inundation in some areas was flood or storm.” [4]

The apparent growing number of natural disasters around the world over this decade, coupled with the increasing awareness of potential climate change effects has highlighted the concern of the re-insurance industry as to whether home policy insurance premiums are adequately covering the risk or that exclusions are being adequately expressed.

Typical policy wording at the time of the Wollongong floods defined flooding as “where water escapes from the confines of a natural watercourse, creek, storm, river, lagoon or lake. However many definitions introduce additional concepts such as an artificial or modified watercourse which might include a drain, even one constructed in an area which had not previously been a watercourse.” [2]

Some definitions have been hardened since that time as a result of the decision on the insurers obligation to clearly inform the insured in writing of the limitations of the policy terms handed down in Hams v CGU Insurance Ltd, 2002. [1]. This hardening has led to the exclusion where rainwater mixes with floodwater.

Other policies have softened the wording to include cover for the notion of ‘flash flooding’ such as inundation within 24 hours of rainfall or a sudden excessive runoff of water as a direct result of a local storm. Other policies have gone even further in the past year by including cover for flooding, and hedging their increased exposure by collecting additional flood premiums distinct from storm provisions.

The need to distinguish between storm and flood, however remains.

**NSW METEOROLOGICAL SYSTEMS**

Storm and rainfall events within NSW are typically generated by a number of meteorological systems:

- **East Coast Lows (ECL)** which usually develop during the winter months. These are large scale storm systems which often develop rapidly and become quite intense, with storm force winds and high rainfall extending over wide areas.

- **Ex-Tropical Cyclones** forming into rain depressions during the summer months. These large scale systems travel southwards and typically generate heavy rainfall over southeast Queensland and northern NSW.

- **Monsoonal Low Pressure systems** moving across the Great Dividing Range (GDR) from north Australia, usually during the late summer and autumn months. These systems mainfest as elongated low pressure troughs stretching from the Northern Territories to the north coast of NSW.

- **Sequence of Fronts** travelling eastwards across southeast Australia, usually in the winter months. The cumulative effect of a sequence of these fronts may produce significant rainfall.
Convective Thunderstorms of high intensity and short duration occur frequently along the coastal plain and the GDR, especially during the summer months. They are generally not widespread and tend to affect local areas.

The Newcastle and Central Coast event of June 2007 was caused by a severe ECL and the 2009 events of February, April and May along the northern NSW and southeast Queensland coast were caused by low pressure troughs forming off the coast and travelling southwards.

**STORM vs FLOOD**

These events have distributed their rainfall in some distinct patterns. The Newcastle & Central Coast storm saw the highest rainfall intensities at the coast diminishing along a reasonable narrow corridor inland because the low pressure cell remained somewhat stationary off the coast before weakening and moving away eastwards. The February 2009 storm evolved into an ECL sitting northeast off Coffs Harbour and primarily affected the coastal strip south of Coffs Harbour to Port Macquarie. The April event covered a larger area centred over the catchments west of Coffs Harbour but extending from Lismore to Newcastle. The May event developed from a trough over southeast Queensland into an ECL off the coast. The centre of the storm travelled inland through Casino then progressed southwards through Grafton and Kempsey bringing widespread rainfall over the middle and upper catchment areas of the large coastal river systems.

The patterns from these events vary from intense coastal rainfall over relatively localised areas, intense rainfall over smaller coastal catchments to widespread rainfall over the middle and upper portions of large coastal catchments.

Any definition of storm vs flood needs to be cast in the context of the physical processes that drive storms, rainfall and runoff. At a simple level, perhaps reasonable to the common person, a storm would entail rainfall rarer than ‘normal’ with runoff coursing its way downslope in an uncontrolled manner. ‘Normal’, in an urban context could be defined as rainfall runoff being contained within the usual stormwater infrastructure. Such infrastructure is usually designed to manage runoff up to a 2yr to 10yr ARI.

Excessive runoff would then exceed ‘normal’ and in a local area will usually always be a direct result of a storm. The exceptions would be a water storage or water supply failure.

At the other end of the hydraulic spectrum, a likewise explanation of natural flooding would be rainfall in the upstream catchment but not in a local area, leading ultimately to waters escaping the confines of the watercourse or lake. This is typically referred to as the ‘sunny day flood’.

The grey area of this spectrum requires some interpretation. Apart from very large river systems where rainfall often only occurs over a small portion of the catchment, or rare circumstances such as concentrated thermal or orographically affected storms, storm related rainfall will generally cover a wide area and thus be likely to occur in a local area as well as the upstream catchment.

As indicated above there are two components of water inundation in a hydraulic sense: 1. surface runoff and overland flow from rainfall in a local area and 2. runoff from upstream exceeding the capacity of the stream channel and utilising its floodplain. In most cases the channel capacity of a natural stream is about a 5yr ARI and modified channels may be more or less than this capacity.

Several possible scenarios arise in considering rainfall and runoff conditions across our spectrum.
<table>
<thead>
<tr>
<th>Storm</th>
<th>River System</th>
<th>Rain in a local area</th>
<th>Local overland inundation</th>
<th>Subsequent floodplain inundation (short timeframe)</th>
<th>Subsequent floodplain inundation (long timeframe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intense local rain</td>
<td>Small</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Widespread heavy rain</td>
<td>Small to Medium</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Light local &amp; heavy upper catchment rain</td>
<td>Medium to Large</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td>Spatially &amp; temporally variable rain</td>
<td>Large</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Intense upper catchment rain</td>
<td>Large</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Whilst 1 is definitely storm and 5 is definitely flooding, the distinction between the two may be based on the proximate nature of the floodplain inundation to the rainfall over a local area. In this sense, subsequent floodplain inundation that occurs within a short timeframe might be considered storm with a long timeframe being considered as flood.

Short streams with relatively small catchments will invariably have short timeframes and for bigger river systems a short timeframe could then be defined as say the order of a day or the duration of the meteorological event. In any case the definition should meet a common understanding of what constitutes a storm with local rain and a flood with remote rain.

This classification schema has proved useful in distinguishing between flash flooding (storm) and mainstream flooding for assessing insurance claims related to the recent floods. Some disagreement, however still exists with some insurers classifying a 3 as flash flooding whilst others classify a 3 as mainstream flooding.

**STREAM CLASSIFICATION**

To further understand the implications of the storm/flood classification on the insurance risk, a methodology was developed to enable streams to be classified for the most common type of flooding likely to be experienced.

It is recognised that individual streams may fulfil the requirements of different categories for individual storms, but on a statistical basis, sections of a stream would comply with a specific classification and thus facilitate a risk assessment.

The methodology accounts for the variance in rainfall distribution, catchment location, stream size and location, and where applicable other orographic factors such as proximity to the GDR or the coastline.

**Stream Length**

The length categorisation provides an indication of the upstream catchment area and (along with rainfall patterns and distribution) the likelihood of there being rain in the local area when inundation occurs and the time of concentration (ie timeframe of floodplain inundation).

<table>
<thead>
<tr>
<th>Stream Type</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small river</td>
<td>length &lt; 10km</td>
</tr>
<tr>
<td>Medium river</td>
<td>10km ≤ length &lt; 50km</td>
</tr>
<tr>
<td>Large river</td>
<td>length ≥ 50km</td>
</tr>
<tr>
<td>Very Large river</td>
<td>Hunter river, Shoalhaven river, Hawkesbury river, Manning river, Hastings river, Macleay river, Clarence river and Richmond river.</td>
</tr>
</tbody>
</table>
Very Large rivers are essentially a subset of Large rivers and are limited to the list shown in the table. Very Large rivers were determined by examining Large rivers on a case by case basis and selecting ones that have the potential to cause a category 5 flood.

**Rainfall Intensity**

The rainfall intensity criteria refers to the likely maximum intensity of rainfall in a given area. The classification methodology utilises a spatial distribution of low, medium and high rainfall regions. The spatial distribution was determined through a statistical assessment of the entire time series of daily rainfall records at all gauge locations operated by the Bureau of Meteorology. High rainfall indicates that a region can be subject to intense rainfall. An elementary assessment was also made of potential rainfall patterns and distribution during likely storm events.

**Catchment Zone**

The catchment zone criteria applies to larger streams (ie medium to large). For a particular stream or a section of a stream, the catchment zone accounts for geographic factors such as topography and proximity to the GDR or the proximity to the coastline in case of a Very Large river. An assessment of the various catchments was made to determine the following catchment zones: Inland Zone, Western Plains, Upper Catchment, Mid/lower Catchment, Coastal Large River Zone

The Upper Catchment zone generally represents regions higher than 300m AHD in elevation. The Inland Zone and Western Plains zones are located to the west of the upper catchment zone and include the tablelands along the GDR. The Mid/lower Catchment is located to the...
east of the divide while the *Coastal Large River Zone* represents regions where a *Very Large river* is likely to cause a category 5 flood.

To facilitate the geo-spatial assessment using these defined datasets, the classification was re-structured as follows:

**Classification** | **Criteria: Streams East of the Great Dividing Range**
--- | ---
1 | Small river, high rain
2 | Small river, med rain or Medium river, med/high rain
3 | Medium river, med/high rain, significant upper catchment or Large river, med/high rain, in upper catchment
4 | Large river, med/high rain, coastal large river zone or Large river, med/high rain, mid/low catchment
5 | Very Large river systems (Hunter, Shoalhaven, Hawkesbury, Manning, Hastings, Macleay, Clarence, Richmond), coastal large river zone

**Classification** | **Criteria: Streams West of the Great Dividing Range**
--- | ---
1 | Small river, high rain
2 | Small river, med/low rain
3 | Medium river, med/high rain, *inland
4 | Medium river, low rain, *inland or Large river, *inland, close to GDR
5 | Large river, *inland, away from GDR

* inland = Inland zone + Western Plains catchment zones
TAKE HOME MESSAGE
The confusion between storm and flood in relation to home insurance has been a curse to the insurance industry, especially since the public outcry after the 1998 Wollongong Floods. Since then, insurers have modified their approaches from strengthening their position to attempting to bypass the issue through the provision of flood cover. The flood cover in some cases has come as an option with increased premiums. Thus the need to distinguish between storm and flood remains. The simple approach presented here provides a common basis for making this assessment.

REFERENCES