The SE Qld Floods

Weather Variability and Catastrophic Risk

The biggest problem we as people have is understanding variability and extremes.

Many social and some natural things follow power law distributions (e.g net worth of Americans, or magnitude of earthquakes), rather than more predictable normal distributions (height of a person). Unfortunately most people can not even begin to understand the extremes and try to pretend all these can be made to fit normal distributions.

Because of this almost all people seriously underestimate the likelyhood of extreme events. Everyone should read “The Black Swan” by N. N. Taleb to get some idea of how badly most people underestimate the extremes, and how the few with somewhat of a grip on these make a fortune out of those who do not try to understand the extremes.

What does this mean to us as local residents?

Brisbane River Flood Levels

It means attempts to mislead us into thinking these are very rare (e.g. one in one hundred year events) are foolish or perhaps deliberately negligent. The recent move to change the flood planning level in Brisbane to the 2011 flood level plus 0.5 metre is the most obvious of these. The 1974 level was higher, and probably 2 or more other flood events from 1893 to 1974 were higher. I would not be surprised if careful research found a more than 50% chance of reaching or exceeding the “new” level within 20 years (and more than 80% chance within 40 years). If insurance companies and governments do not ensure such research is carried out they will have been negligent.

Rain Forecasting

In similar vein, understanding of weather forecasts, especially the variability involved, must be improved. The computer generated forecasts are really of how much water is available for rain and whether regionally the conditions will be right for rain to fall.

A forecast of 10 mm for the south east of Queensland (Toowoomba to the coast), will on most occasions come in scattered storms. This means for each recording station that gets 50 mm there will be 4 stations with only a couple of mm or none at all. Some might incorrectly say the forecast was wrong for 4 out of 5 recording stations. To try to estimate accuracy of forecasts with this variability is very hard, and the result is likely to be very misleading.

However under much larger general systems the forecasting is likely to be more accurate, although even then the forecast may be only within 50% (i.e. a forecast of 200 mm may be between 100 and 300 mm). On Saturday the 8th January the Bureau of Meteorology (BOM) produced a forecast for Monday the 10th of January of 200 to 300 mm for Brisbane to the Sunshine Coast. Much of the eastern half of the Brisbane River catchment was indicated to be likely to receive 150 to 200 mm on the Monday. I saw the forecast image Saturday evening, then captured the image off the BOM web page Sunday morning and e-mailed it to a friend in the Pine Rivers area suggesting their place would go from being a swamp to a lake on Monday.

Rainfall: Forecast Rainfall

Forecast for Monday 10 January 2011

About forecast rainfall

These rainfall forecasts are produced from computer models. As they contain no input from weather forecasters, it is important to also check the Bureau's local forecasts and warnings.

Controls

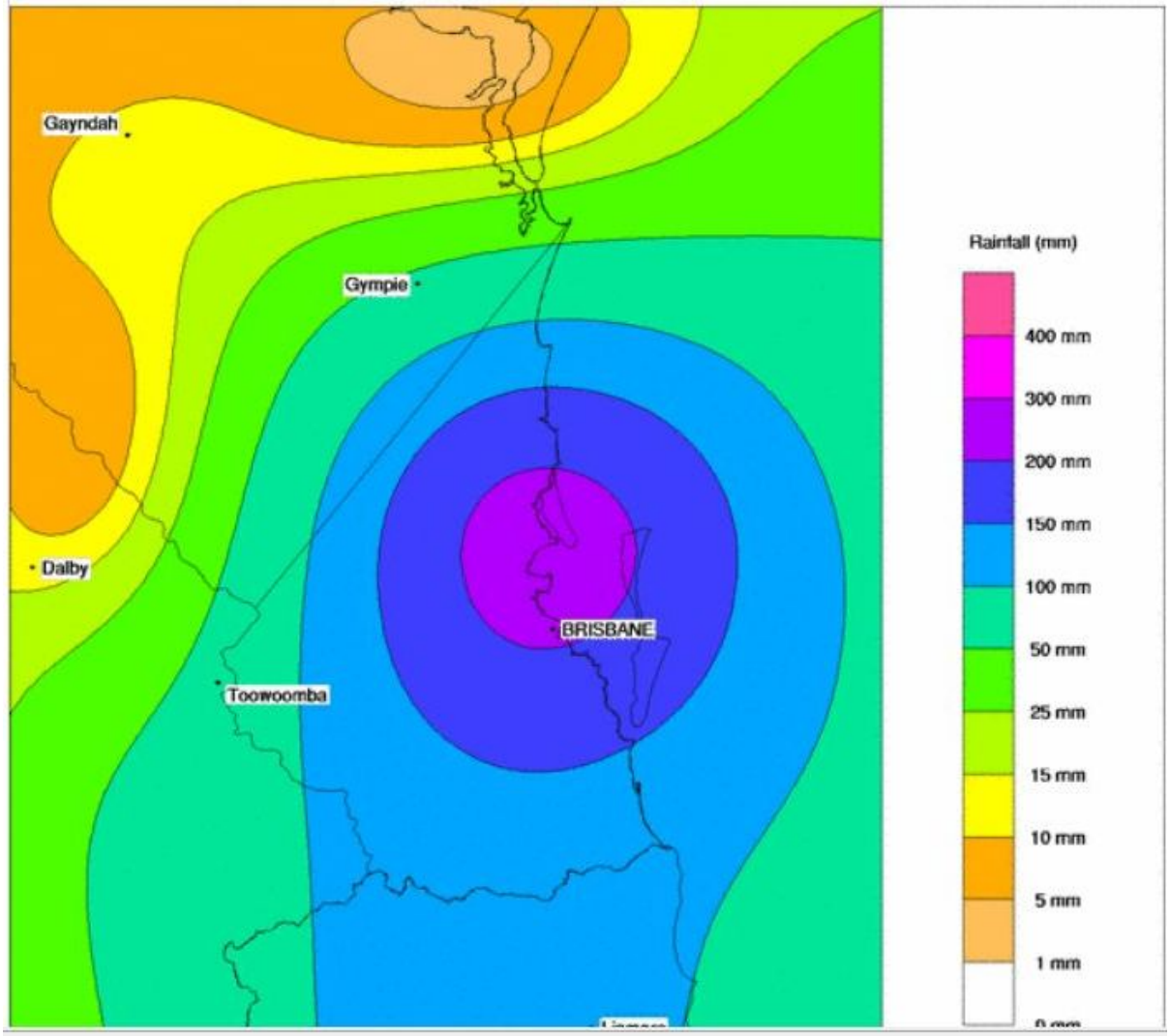
Map: Forecast Rainfall | Chance of Rainfall | Total Forecast Rainfall

Date: 10/01/2011 - Monday (EARLIER / LATER)

Location: Queensland / Southeast Coast

Zoom out

Rainfall forecast for 10/01/2011



The page it came from does have warnings about variability and accuracy. The attached appendix has the rainfall figures available from the BOM web page for some of the stations in and east of the Brisbane River Catchment. They indicate the forecast for the Monday the 10th was quite accurate.

It is important to note that the south east of Queensland was already saturated, and some of the flood mitigation basins along the range from Toowoomba were already overflowing on the preceding Thursday. The rain did not stop till the next Wednesday.

Unfortunately the discharges from Wivenhoe Dam on the Friday, Saturday and Sunday were almost same each day at around the 100,000 megalitres a day (a skeptic might suggest after a hectic 2 weeks with the dam over capacity from just before Christmas, the decision makers decided on a steady release figure on Thursday the 6th, tidied up their desks on Friday and took the weekend off).

At the very least there should have been meetings on the Saturday (even if it took BOM or Emergency Management Queensland to initiate them), to reconsider the required discharges in view of the BOM Saturday forecast for Monday. The release of an additional 100,000 megalitres on each of Saturday, Sunday and Monday would probably have put flooding due to the release up from minor to medium flood level, but being able to take the Tuesday release down from 660,000 megalitres to 360,000 megalitres, may after combining with the floods from Lockyer Creek and Bremer River have reduced the ultimate peak in Ipswich by 4 or 5 metres and by 1 metre in Brisbane city.

The major problem seemed to have been the inability to quickly review and change the dam discharges. This has been shown again when it took 3 weeks after the flood to decide to reduce the dam down to 75% of full “in case there is another big rainfall event” although there was (and still is) no big rainfall event within the reasonably accurate forecasting period.

Better procedures must be put in place to allow quicker changes to the dam discharge in response to actual and forecast rainfall events.

Toowoomba – a one in 20 year event?

From the “History Repeats” by Doug Parrington in the Toowoomba Chronicle on 22nd January, there have been 15 or more flood events in Toowoomba over 160 years. Some of these certainly had even more water than the January 10th 2011 event. The 15 plus events argue strongly against the January 10th 2011 event being a “one in 200 year event”.

Obviously the Toowoomba Regional Council, and the town residents (and the Main Roads and railways departments) have been lulled into a false sense of security. All must reassess how often these events occur. The planning and maintenance required to ease the passage of these occasional large flood events simply has not occurred.

The recently released Toowoomba City Masterplan, has much of the area flooded along West Creek (from James to Herries and from Russell to Bridge Streets) earmarked for unit development. Obviously with a high risk of flooding this must not be permitted. Perhaps the minimum starting point would be like Brisbane, take the flood level of this flood, add 0.5 m and not allow new development on land lower than that.

In the flood the bridges on West Creek at James St, Herries St, Margaret St and Russell St all held back lots of water (probably more water went down Victoria St between Margaret St and Russell St than was in the creek).

Picture from the Chronicle on-line. An almost metre drop in the water as it poured over Russell St can be seen in the picture. Obviously the designers who prepared the creek beautification and flood mitigation designs for West Creek, all of which had been carried out over the last 10 years, had been given peak flow estimates that were too low, and had been lulled into a false sense of security.

Downstream the old bridges at Bridge St, Jellicoe St, North St and Griffith St all suffered. Two months later there are still significant delays for people travelling east-west in this part of town and the businesses with little or no passing traffic must be hurting. Hopefully the eventual replacement bridges will be designed to be above the peak of this flow and built to survive a larger peak flow than this event.

On East Creek, Hume Street was well under water and the bridge on Neil St dammed up water forcing lots out onto Chalk Drive. This part of East Creek had all been reworked in the 1990s, with the final part being the council carpark at the Hume St Chalk Drive corner.

Similarly the businesses in Withcott that had a metre of water run down the highway and in their door may blame the bridges on the creek for blocking water which then had to run down the highway.

Council did get a geotechnical assessment of the stability and safety of the Cooby, Perserverance and Cressbrook dam walls during the drought.

I wonder if the road cuttings on the Toowoomba Range, Mt Kynoch, Blackbutt Range and Cunninghams Gap had geotechnical assessments? Perhaps after an excessively long dry spell they were just assumed to be good. The rain proved otherwise.

Conclusion

The risk of a recurrence is still the big question. The history mentioned above indicates it will happen. In fact 5 of the past flooding events in Toowoomba were followed within 4 to 6 years by another similar flooding event.

This suggests a 50% chance that we will have another similar flooding event within 6 years!

Maybe some can ignore this and hope we make the slim 10% chance a similar event does not occur for another 40 years. However for Council or the State Government to bury their heads in the sand like an ostrich, hoping it won't get them would be deliberate negligence.

We need a proper assessment of the risk and an effort made to help everyone understand the risk.

Comment

I was in Toowoomba city centre on Monday 10th January when the storm went overhead.

It was raining steadily at 1:00 pm, with already runoff from concrete and bitumen yards and carparks, as well as roof guttering pouring water out into the street. Obviously most of the city area has 100% runoff, and much of the suburbs especially the shopping centres the same.

From1:00 to after 2:00pm there was considerable lightning and heavy rain. Around 2:30 pm as I was leaving Gardentown, they announced they were closing it (because of the potential for flooding, although that was not mentioned at that stage). There was already water over Margaret St at West Creek. I walked away up hill. There had been no notice, or announcements of flooding nor warnings that there may be flooding.

On reaching the car I drove away, with creeks closed, to K-Mart, did some shopping and drove around the ridges. I went via Stenner St, Rowbotham St, around and across Cohoe St to Mackenzie St down to Mary St, Stuart St in Mt Lofty and out on to the New England Highway.

With the rockfall in Mt Kynoch, there was a delay of about an hour till the council and police arranged the traffic onto the downlane, and I went home.

With essentially no notice of flooding it was common sense to keep away from the creeks.