

Plan & Develop with Nature

(A Submission to the Queensland Floods Commission of Inquiry)

This submission argues that we must accept that we cannot conquer nature and that a river is a good example of a natural feature that cannot be tamed and that we must plan and develop our settlements accordingly. Whilst the submission discusses issues basically relevant to South East Queensland (SEQ), the principles are applicable state-wide.

Rivers are not static but dynamic living landscape element. They wander, twist and turn (meander) across the landscape – they are forever moving. They are constantly transporting eroded material in the form of silt, sand, gravel and rock boulders from the upper reaches of their catchments down to their lower reaches and then out to sea. In this manner their channels meander and migrate continuously downstream over long periods of time – but moving all the same. What must also be realised is that rivers move sideways across their floodplains as they undercut the outer banks of their bends and deposit silt, sand and gravel on the inside bends of their meanders.

The notion that we can “flood proof” settlements especially their communities living within the floodplains of rivers is a misguided intent. No civilisation has ever successfully “tamed” a river system – certainly not through concrete banks, dams, barrages or other man-made structures. This was unfortunately demonstrated in January through the power of the flooded Brisbane River system and other rivers in SEQ and the state that wrought damage and destruction on so many communities. The worst affected areas were the floodplains of these rivers - low lying flat lands adjacent to river channels over which the waters of swollen rivers in flood will flow, depositing silt, sand, and gravel and other material and debris in their wake.

Besides running parallel to river channels, floodplains can extend outwards from the waterways for some distances. One sure way to determine the extent of these floodplains is to examine a surface geological map. These maps will indicate a geological formation called Quaternary Alluvium which will normally be designated in yellow on coloured geological maps and by the symbol “Qa”. Quaternary Alluvium is the silt, sand and gravel that rivers deposit across the surface of the landscape at times of peak flow – ie when they are in flood. These soil/geological deposits were laid down over thousands of years hence they indicate the maximum extent of flooding across the landscape – the largest floods. The term “Quaternary” refers to the most recent geological time period during which this flooding has occurred - a geological period of 2.6 million years – essentially the same time that humans have existed on Earth.

The key to this approach is to then identify those Quaternary Alluvium parts of the floodplain with the highest risk of flooding. This approach entails identifying a landscape formation known as river terraces. As you move away from a river the land becomes progressively higher in the form of a series of steps or terraces which represent former levels of older floodplains. It stands to reason that the lower terraces – those closest to the river would be those with the highest risk of flooding. As you move progressively away from the river over the floodplain you move up the stepped terraces to high ground with decreasing likelihood of flooding. In their

natural state, these terraces across the floodplain are also characterised by distinctive soils and native vegetation.

All this is not rocket science, in fact it is taught in high school physical geography and geomorphology classes.

Not-with-standing the modelling and other work being done to determine various flood heights, a cursory look at a geological map is a very good indicator of the past flooding history of a river. Sadly, there is a very good correlation between the Quaternary Alluvium shown on the geological maps of SEQ and those areas worst flooded in January.

On the basis that we can never successfully “flood proof” a community we must ask the question – why do we still persist? Why are so many urban and peri-urban developments continuing to be allowed to built across these flood plains – on top of the yellow Quaternary Alluvium and why have these areas not been subjected to different planning conditions and building codes? Why has this happened without any modification to their planning and design? If we persist and build in the floodplains then why do we continue to build the same building structures there as we do outside the floodplain – there are no modifications to planning and design that acknowledges that sooner or later these areas will be subjected to flooding.

Progressive societies learn from their experiences and past mistakes – they adapt in order to ensure that their resilience is enhanced, that they are sustainable and that they do not put their constituents in harms way of future natural hazards (as we have come to distinguish acts of nature that cause disasters and human suffering and stress).

We must accept as a fundamental principle that we cannot tame nature and that “flood proofing” is an unachievable and ill-conceived dream. We must also accept that we must harmonise our development goals with the forces of nature – we must **plan & develop with nature!**

In the wake of the recent SEQ floods, a smart move would be to acknowledge past mistakes, to learn from those experiences, and adapt how we rebuild - a smart community would NOT rebuild what was there before the floods only to repeat these same mistakes in the future.

It makes no sense to rebuild exactly what we had before the floods and we should certainly not rebuild in the most dangerous parts of the floodplains of our river systems. Whilst we cannot “flood proof” our urban settlements, we can certainly go a long way to minimise the impacts from future floods which invariably will reoccur. We must also acknowledge that under climate change scenarios we know that we will face the likelihood of increasing frequency of more intense natural hazards – floods included.

Whilst there is no suggestion that we should or could revert to pre-settlement conditions, we need to acknowledge that some elements of the original natural landscape performed certain basic functions which have subsequently been lost in our quest to tame the landscape with our developments. One classic example is the

role of the floodplain and in particular its riparian zone. This is the interface zone between a water course and the land comprising the floodplain and is recognised in its natural state by its highly productive soils supporting a range of distinctive vegetation.

This important zone performs a number of critical functions including flood control, as a filter and sediment trap for overland flows entering the water course, bank stabilisation, wildlife habitat, micro-climate control, and contributing to scenic amenity to name but a few. Riparian zones can also coincide with the lowest part of the floodplain – that part with the highest risk of flooding. Hence riparian zones in their natural state exist as parallel corridors of good quality vegetation containing the watercourse and thus lend themselves to performing as ideal linear landscape corridors linking country and city – what have become commonly known as “greenways”.

Elsewhere, the floodplain is made up of flood basins which are extensive low lying areas adjacent to rivers and typically at the confluence of watercourses. Their natural function is to absorb large volumes of flood water during periods of high intensity rainfall thereby acting as a buffer by taking the edge off the peak flows in the river. These areas are highly susceptible to flooding and no amount of engineering works and importation of fill are going to raise them above peak flood levels. Through the incremental filling in of these flood basins, their flood water compartments have been progressively decreased so that they cannot perform their intended natural functions. Again we would benefit if these feature were re-established to fulfil their original natural functions in our landscape and assist us to become more resilient to flooding.

Because we have largely ignored the natural functions of riparian zones and flood basins and built over the floodplains, we have consequently deprived ourselves of the first order of natural buffering that these natural landscape features can perform for us particularly in flood times. Hence it makes good sense to seek opportunities to re-establish these functions as part of our post-disaster reconstruction.

A bold move would be to strategically and selectively reinstate riparian zones throughout our urban and peri-urban areas. We can reorientate them towards their original functions by incorporating them into a regional greenspace network for the benefit of the whole community. Another bold move would be to reinstate some of the key flood basins – the Rocklea-lower Oxley Creek-eastern Chelmer being a classic example. These areas could be put to good use, partly as urban forests, for outdoor recreation purposes and also brought into production for urban agriculture. Again these features can provide key elements of a strategic greenspace framework. In this way they can provide the community with more than just flood mitigation support – they can make a very positive contribution to the value of the region’s ecosystem services and to climate change adaptation, not to mention the countless positive outcomes that would stem from promoting agricultural enterprises back within the “city walls”. All of these initiatives would make very positive contributions towards improving the liveability of the city and region.

Retrofitting and reorganising the land use pattern of long established settlements is not without challenges. One of the most significant challenge in attempting to

recover from past mistakes, to implement urban retreat policies, to implement alternative greenspace related activities, concerns the return of freehold land in the flood prone areas to the public estate. Politically this is a highly sensitive issue. However the recent floods provide an opportunity to do so as the consequences of not adapting in the wake of the recent disasters and taking responsible recovery actions are still foremost in the minds of the community (especially when the 1974 Brisbane floods are also considered). However, this will require strong political leadership.

A second and associated challenge centres on the financing of these initiatives. Whilst under normal circumstances this may appear to be an insurmountable hurdle, the post 2011 floods event has seen the implementation of a Flood Levy by the federal government. Clearly there is a strong case that a proportion of the revenue raised by this and any future disaster levy should be strategically employed for the purposes advocated. The Flood Levy should be use in the interest of the whole community!

It is not too romantic to advocate a greater role for nature in the management of our communities but we must learn to adapt to the ways of nature, to understand the forces of nature and to be prepared to make some bold decisions for the benefit of the whole community – for existing and future generations. This way we are enlisting the assistance of nature in the management of our city and rural landscapes but first we must relearn how to **plan & develop with nature!**

Darryl Low Choy
Professor, Environmental and Landscape Planning
Griffith University
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