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Natural Disaster Funding Arrangements  
Productivity Commission  
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Thank you for providing the opportunity to make a submission to the inquiry.

In view of your intention (p.37) to “take into account evidence from previous reports, reviews and inquiries, including best practice, from overseas and in Australia”, I would like to draw your attention to the following NCCARF report “Living with floods: key lessons from Australia and abroad”, available at: <http://www.nccarf.edu.au/publications/living-floods-key-lessons-australia-and-abroad> (Wenger *et al.*, 2013). As well as analyzing the 2010-11 Australian flood reviews, it includes three case studies on flood management in the Netherlands, China and USA.

I will not repeat the findings of the report but I would like to highlight a few issues that may be of relevance to the current inquiry.

**Type of mitigation activities chosen**

When assessing mitigation strategies, great caution is needed when considering structural mitigation such as dams and levees. Some countries have relied on such means for centuries and they do not believe this will provide sufficient protection against future flood threats associated with climate change and population growth. Rather, they are looking to *decrease* their reliance on such methods.

The case studies in the ‘Living with Floods’ report reveal significant problems with levees (for example, see summary of recent USA levee reviews, starting p.186 of the ‘Living with Floods’ report).

A major issue is that levees encourage additional development behind them. Thus although they decrease *frequency* of flooding, they add to the *consequence* side of the risk equation. *All* levees can one day be expected to fail in a major event, and we are likely to see more major events (Hirabayashi *et al.*, 2013). Likelihood of greater consequence must be factored into cost benefit analysis of levees.

As well as increasing the value of assets at risk, the consequences of levee breach, overtopping or other failures commonly results in worse flooding than would have been experienced had they not been there, both in terms of power of flood water at the point of break, the duration of flooding when trapped behind levees (in Gannawarra Shire, this resulted in flooding for 3 ½ months: Gannawarra Shire Council, 2011), and in lost awareness and experience of the hazard.

A key point I would like to make is that *Australian Government funding of levees and dams subsidises inappropriate development of flood prone land*. Lower levels of government commonly

view structural mitigation as an opportunity to downgrade building controls. I provide you with 3 examples from Rockhampton, Launceston and Brisbane:

A recent flood study for Rockhampton promoted the benefit that a levee would open up land previously unavailable for development to development (see p. 59 AECOM, 2011). This is a relatively common flood study finding.

In the Launceston example, joint funding of levees was provided by the Commonwealth, State and local governments. Funding was conditional on the maintenance of strict development controls preventing further development behind the levees. Once the project was approved, the local government promptly approved additional development. At the time, this was prevented by the threat of withdrawal of funds by higher levels of government (Atkins and Vince, 2009). However, I understand that with the levee recently completed, behind-the-levee development has once again been approved by the council in the form of a multi-storey accommodation for international university students – people who, in the event of a disaster, would have limited financial means, limited transport and limited community networks for assistance; this is not in the spirit of ‘resilience’ (see <http://www.utas.edu.au/latest-news/utas-homepage-news/utas-welcomes-west-park-da-approval>).

In yet another instance, the Hume dam in Queensland has facilitated development of flood prone land in Brisbane. The Queensland Floods Commission of Inquiry notes the difficulty that Brisbane experienced when identifying its ‘defined flood level’. Estimates ranged from 3.16m to 5.34m at the city gauge – a massive difference. Note the following points:

- The mitigating effect of the dam was taken into account when determining a DFL. The mitigating effects of the dam were thus negated and land that would earlier have been deemed too flood prone to develop was thus opened up for development.
- A reason the earlier 5.34m calculation was discarded was due to assumptions included in the methodology. For example, there was disagreement with the assumption that Wivenhoe and Somerset Dams would be at full supply level at the start of a flood and that no water would be lost to the ground. These are strange assumptions to discard as, according to dam operational manuals, “a flood is taken to commence when the dam reaches prescribed levels above the full supply levels”. At the start of the 2010–11 floods, catchments were already saturated, so little water would have been lost to the ground.

Thus the definition of flood prone land can be manipulated with the help of structural mitigation.

Should the Australian Government be bankrolling the continued development of unsuitable flood prone areas by subsidising the infrastructure that enables it? Moreover, taxpayers are likely to pay for this subsidy down the track when structural mitigation fails to mitigate large magnitude floods, and additional disaster recovery funds are sought. The emphasis is on *when* because levees and dams are only able to mitigate low to medium sized floods. They cannot be expected to prevent large, infrequent floods.

Note also that as climate change (and population growth) are expected to increase flood intensity, that the ‘design height’ may have limited validity in the future. See p.193-197 of the Living with Floods report, or (Wenger *et al.*, 2012), for a discussion questioning the adequacy of the 1:100 DFL. Note also USA findings that 1/3 of flood claims and losses accrue from properties outside the 1% zone (1:100 year event) (Galloway *et al.*, 2006).

I would suggest that if the Australian government decides it wishes to invest in mitigation infrastructure that it should very carefully take into account the problems experienced in other parts of the world, including all the hidden costs, such as potential liability and external costs that are not adequately taken into account in cost benefit analysis. The short time frame of CBA (a discount rate of ~30 years) makes it impossible to calculate the problems and ongoing high costs experienced by countries with a long-term levee dependency. Levees are unlikely to have significant maintenance costs in the first 50 years. I suggest that current cost benefit analysis methodologies are also prone to manipulation (through arbitrary weightings, inclusions/exclusions and discount rating) and do not necessarily result in the most long-term adaptive solution being chosen. In terms of sustainability in the context of disaster management, I would like to refer you to (Dovers, 2005; Handmer and Dovers, 2007).

In particular I would urge the government to place strong conditions on any structural funding approved to prohibit further development of areas protected by levees and dams, to maintain building standards (for urban renewal) behind them to address residual risk, and to impose meaningful penalties for infringements, such as the withdrawal of future regional development funds.

### **Are there more adaptive mitigation methods?**

- Development planning, controls and building standards are a primary prevention method and the IPCC (2014) noted that this was an area where there was much room for improvement in Australia.

Unlike some other countries, Australian governments (all levels) are not liable for private flood losses. This means that while governments have control over where development is sited, they take no responsibility for the consequences of poor siting. Unless there is better accountability, primary prevention measures like development controls will continue to fail us.

There are numerous loop holes and counter-incentives that encourage irresponsible development planning. The Queensland Floods Commission of Inquiry documents many failures to consider flood risk, not only because of lack of flood mapping but because of 'material change of use that is code assessable' (where alternative codes sometimes did not consider flood risk), and satellite planning schemes that operate under separate state legislation. The latter included fast-track legislation for affordable housing (QFCI, 2012).

Development planning failures are likely the result of policy conflict, ie, short term economic gains for state and local governments relating to development gains and affordable housing, versus long term gains (with damages currently incurred largely by the Australian Government) in avoided flood damages. This is in addition to significant financial penalties (eg, court costs defending decisions, compensation claims, loss of development gains, lower land values), lack of incentives and lack of resources for local government to adequately reflect risk in planning schemes (Wenger, 2013).

*Appropriate legal protection for local governments, incentives and disincentives need to be created.* For example, regional development funding, and similar funding sources could be contingent on communities adopting minimal standards of flood mapping and development controls and removing inconsistencies in state legislation. This is done in the United States as a condition for communities to receive cheap, nationally-subsidized flood insurance (Wright, 2000, p.35).

- Reviews from the United States have found that house raising provides more effective flood mitigation than a levee built to the same design level (Galloway *et al.*, 2007; ILPRC, 2006). If a levee fails, the effect will be worse than if the levee had not been there. However, a house built to the same design height (floor level) will continue to experience a mitigation benefit and may only be inundated by a few centimetres (NB: damage is correlated with depth of flooding, as well as velocity – house raising is inappropriate in areas of high velocity, in which case relocation is the better option).

There are other advantages of property based measures such as house raising and flood proofing: the direct beneficiary is expected to pay a significant proportion of the costs so there is less cross-subsidy; it can be done incrementally so there are no large up-front costs; ongoing maintenance and liability are less likely to be a problem; awareness of risk is retained; and the floodplain is not excised. This means fewer adverse impacts for nearby properties, downstream communities, riparian ecosystems and natural resource dependent industries.

- There is a role for the insurance industry in providing market incentives for property-based measures. I'd like to draw your attention to the Property Resilience Exposure Program. Being able to insure based on the (certified) characteristics of your property, including floor level and flood proofing, would provide a market incentive to mitigate your property. This would reduce insurance premiums / increase insurance affordability for individual property owners who invest in mitigation. Another way insurance could assist would be to offer supplementary mitigation insurance to help fund improved rebuilds following a disaster. This is a feature of the USA's national flood insurance program.
- Relocation is often perceived as being the least affordable option. However, experience, both in Australia and overseas, shows that this does not have to be the case. In many countries, including Australia's Grantham, land swap has proved to be flexible and cost effective. It is claimed the landswap of over a hundred homes at Grantham has already paid for itself in avoided damages (LVRC, 2013). The USA has reported similar experiences (Freitag *et al.*, 2009; NWF, 1998). Physical relocation of buildings by moving them to higher ground on the property is also relatively affordable where higher ground is available.
- Timing is crucial for the uptake of both relocation and house raising schemes – ie, immediately following a disaster as part of the recovery process - and this should form part of a planned strategy (including budgetary planning) (Wenger, in press).
- Overseas, there is a lot of interest in enhancing the natural buffering capacity of the landscape through protecting and restoring wetlands, restoring connectivity between rivers and wetlands, broadening floodplains through levee setback (relocation of levees inland), re-vegetation of upper catchments and river banks, activating natural floodways (which are sometimes gated), and restoring meanders and side channels to increase catchment-wide water holding capacity. Some argue that such measures are insufficient for *major* floods. However, neither are levees and dams sufficient for major events, and unlike structural mitigation, natural flood mitigation will never entirely fail but will continue to provide some buffering effect. Used in conjunction with traditional mitigation, it can also reduce flood levels (reducing likelihood of overtopping or breach) and reduce maintenance costs.

- In Australia, planning flood mitigation is much more siloed than in other countries where the costs and benefits of other sectors and communities are integrated into flood management strategies. This provides better and more sustainable overall outcomes for society as a whole. Another characteristic of overseas programs is that they often cater better for catchment-wide planning, which is important for flooding, bound by natural catchment boundaries. This is done in some places in Australia but existing catchment mechanisms are under threat, with Catchment Management Authorities being abolished, under-resourced and their powers weakened.

### **Betterment funding**

The United States has experienced similar issues with betterment funding as in Australia. The length of time it takes for assessment is too long when infrastructure needs immediate restoration. One of the ways it rapidly assesses damages (and whether betterment is merited) is to look at cumulative damages to the property as a proportion of property value (FEMA, 2010; NWF, 1998).

The USA sets aside a percentage of disaster relief funds towards preventative recovery. Any revision of NDRRA, or its replacement, should do likewise. This should be included in recovery arrangements. It should not be an inequitable redistribution of GST funds, nor should it be funded by savings elsewhere in the Attorney-General's portfolio.

The untargeted nature of the AGDRP is a concern. Over a billion was spent in 3 years. Moreover \$1000 per person is insufficient for any meaningful recovery for people in need who have lost everything. Other countries, including the UK, have larger individual recovery grants and they specifically target repairs. Better targeting of recovery grants to those most severely affected is needed so they can make meaningful changes (for example, to help fund private betterment).

Where there is a known flood risk, emergency accommodation and supplies that extend into the recovery period should be part of standard local contingency planning, to which other levels of government could contribute.

### **Resilience**

As a final note, I was puzzled but the use of the term 'resilience' in the issues paper. While it is defined as 'capability to prevent, mitigate, prepare for, respond to and recover from the impacts of natural disasters', the issues paper regularly refers to 'mitigation AND resilience', and figure 1, for example includes project categories 'mitigation, resilience, relief (ie, response), recovery'. This suggests 'resilience' equates to the missing element – preparation. According to the resilience definition, *any* natural disaster funding activity can be labelled 'resilience' (whether or not it truly results in resilience), and I would suggest greater clarity or consistency surrounding the use of this term would be beneficial.

Yours sincerely,

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