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CSIRO Submission 14/507

Draft report on Natural Disaster Funding Arrangements

Productivity Commission, Australian Government

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CSIRO welcomes the opportunity to provide comments on the Natural Disaster Funding Arrangements Draft Report. We note that public hearings have been scheduled and would be happy to attend and provide further detail about this written input at your request.

Further to our submission to this inquiry, we are providing:

1. Detailed general comments provided by page, and
2. Responses to specific requests for information.

1. General comments

Page 6, Figure 2 seems to omit some secondary indirect fiscal costs (or income foregone), such as reduced income from royalties to government treasuries; increased costs of capital if there is competition for resources in recovery from multiple events; increased needs for investment in emergency services if there is an increased incidence of multiple events occurring simultaneously (e.g. because of development and planning decisions, etc.) (This comment also applies to Figure.2.2 on page 237, discussion on pages 45 and 46 and section 2.4 on page249). The factors included depends on the purpose of the analysis, as mentioned in pages 239-256. If the Commission's purpose is to assess public exposure to insufficient investment in resilience, a more systematic appraisal of such emergent fiscal impacts might affect prioritisation of these issues among others in the management of the economy.

Page 12 paragraph 5 CSIRO notes that the residual 'risk appetite' of households and organisations is poorly understood, and biased towards accepting greater risks into the more distance future.

Page 13 paragraph 1 Whilst it may not be possible to identify the best set of risk management actions at a community scale, it is not clear that this is more true with respect to disasters than for other policy measures.

Page13 paragraph 4 CSIRO suggests that short-sightedness might be minimised by more formal calculations of the risks of inaction and benefits of mitigation over Intergenerational Report timescales. This could expose the expected future budgetary impacts of inaction in the same way that aging populations and retirement ages are considered in recent Intergenerational Reports, noted on p.79. This is also relevant to "selecting the 'right' amount that the Australian Government should contribute" (p.114) and assessing "imputed 'savings'" (p.150) that may be reflected in improved estimates of future costs (p.140, Draft Recommendation 3.3).

Page 19 CSIRO notes the potential for a post-disaster quick response team to combine several important functions, to

(i) assess damages and reconstruction options;
(ii) record the benefits accrued from previous mitigation activities (thus building a better database for the benchmark costs for betterment and benefits in future events); and
(iii) understand how and why damage occurs (the only part of this triplet that is already carried out after bushfires, for example).

It would be efficient to coordinate these assessor and research activities.

Page 21 paragraph 5 (and page 101) It may be true that analyses of individual mitigation works have not taken account of the probability of a natural disaster. However, several CSIRO studies specifically *do* take account of *ex ante* disaster probabilities, at considerable scale in some cases. These include Stewart & Wang (2011)[1] (simulating 90 years of probabilistic extreme wind events to explore the net present benefits of applying cyclone building standards in SE Queensland) and CSIRO (2014)[2] (90 years of probabilistic flood, wind and coastal inundation events to explore the net present benefits of mitigation options under different policy stances). Both of these studies show major net present benefits of acting. These and other studies could provide the basis for an Intergenerational Report style of analysis of national risks, as mentioned above. (Both studies were conceived as studies considering climate change, but the majority of the benefits found are from immediate action, signalling the lack of preparedness for today's hazard profiles.)

Page 22 paragraph 3 Research on information salience suggests that changing insurance premiums without explaining why will not necessarily change behaviour constructively.

Page 26 CSIRO suggests the Commission could present a clearer architecture for information. Currently the discussion is split between a national platform for natural hazard data and information collection guidelines. Whilst these are key levels to differentiate, it may help to more systematically identify which sorts of decisions need which type of data with what level of consistency, thereby defining a package of data provision at 3 levels, at least. The following table suggests a starting point.

Category	Rationale
1. National datasets, centrally held	Datasets that are (i) more efficiently collected nationally, or (ii) targeted specifically at nationally consistent decision making that requires more-or-less universal coverage (which is probably for setting broad priorities and in this case therefore may not need great precision). Some datasets are already national and held centrally (e.g. by Geoscience Australia) and there may be a case for more of these. These include national level hazard maps, though there may be local datasets with more precision under category (2). Some datasets may also be more efficiently maintained nationally if they are universally subject to continual change and need to have a consistent dateline (e.g. in response to global environmental changes that affect the whole continent).

[1] Stewart, M. G. and Wang, X. (2011). *Risk Assessment of Climate Adaptation Strategies for Extreme Wind Events in Queensland*. CSIRO, Melbourne, Australia. (Available at: http://www.csiro.au/resources/Adapt-Extreme-Wind-Events-Queensland.html)

[2] CSIRO (2014). *Policy Analysis Summary – national responses to current and future hazards to Residential Housing*. CSIRO, Australia

2. Regional/local datasets, collected in standardised ways	Datasets do not need to be held nationally or in one place, nor necessarily to be universal, but need to be collected in standardised ways so that comparisons can be made across jurisdictional or other boundaries; for these there is a strong case for national setting of standards but not actual data collection or storage. Where these dataset are aimed at high hazard regions, this enables a nesting of more detailed datasets (e.g. greater accuracy on location of buildings or more precise digital elevation data) for critical locations within a consistent but less precise national dataset under category (1). Note that a considerable dataset on benchmarks for costs and benefits of mitigation actions are likely to fall in this category.
3. Locally differentiated datasets	These can be safely locally differentiated and do not require great coordination, for example because they are only used locally, or because they are used to create other information which is comparable across regions, such as the return on investment from a potential mitigation project.

It could be acknowledged more strongly that information on hazards and exposure is not stationary in time (thanks to population change, infrastructure development and in view of long term climate change) and so ongoing data collection and monitoring is needed to understand changes in hazards and their spatial reach - particularly in relation to changing patterns of exposure and vulnerability. Where changes are widespread, if analyses of investment priorities depend on local data collection, even under consistent collection standards, then databases for different parts of the continent are likely to be very asynchronously updated, making comparisons difficult or inequitable.

Page 30 paragraph 6 While insurance markets may be pricing risk with increasing granularity, it is not clear that this price signal is getting through to consumers in ways which enable them to change behaviour – for example, many insurers indicate that the addition of extra locks will reduce premiums, but equivalent indications of how insured parties should change their behaviour (or modify their assets) to reduce their disaster-related premiums do not seem to be provided. Thus there is no explanation of what action is needed "to reduce their risk, where such action will be recognised with a lower premium" (page 365; see also page 435). At present this may lead to an incentive to shop around among insurers and perhaps find one that is pricing the (unknown) risk less well. This will continue in the absence of more guidance about how insurers are adjusting their premiums to allow for risks to individual assets (cf. page 27, para 4, notwithstanding recognition of this point at pages 382 and 435). Given that insurers may not be able to track detailed resilience-building activities at individual property levels, approaches such as the nationally-coordinated US STAR program (page 384) may be needed, but are not highlighted in the recommendations.

Page 30 "Existing areas of settlement" (and page 431ff) The only conclusion of this sub-section seems to be observing costliness. However, there are some retrofitting activities which are inexpensive and easily implemented, which provide significant benefits (even if these fall

considerably short of those achievable in new buildings), and which could be encouraged by governments and potentially by building standards. For example, modest and inexpensive improvements to roof ties deliver significant protection for old buildings in cyclone areas, though less than the full application of cyclone building codes in new buildings[3]. The recommendation might be improved by suggesting careful appraisal of retrofitting actions and the implementation of those that make sense. This is particularly so beyond cyclones and bushfires which have probably received most attention in this regard.

Page 39 "Managing shared risks" Recommendations in this section relate to potential for collaboration and partnerships between levels of government and industry, mainly around issues of data (e.g. Recommendation 4.2, page 42). CSIRO notes the broader issue of building a "Resilience Agency community" comparable to the very effective disaster response and recovery community that has built up in recent years. There has been growth in diverse organisations working well together in response to disasters, but such relationships can be challenging for complex long-term issues [4]. Are there key limiting factors in building the equivalent quality of relationships and capacity among the different set of organisations needed for mitigation? For example, is the relationship sufficient to deliver better, equitable and transparent cost sharing and acceptance of residual risks? There are technical information needs regarding alternative 'levers' for government, but if there are failings in how institutions (levels of government, community, private sector) will work together to deliver long-term resilience, then these technical issues are probably secondary. CSIRO emphasises the focus on working together effectively. Even for the 'levers', there are issues around how they will work in different social and institutional environments. An important factor is the capacity of disaster mitigation networks to collaborate and solve long-term problems and Commonwealth leadership is likely to be important in this issue.

Page 158 Box 4.2 CSIRO's contribution in could better be described as: "Applied technical and social research for improved understanding of natural hazards and risks, and of mitigation options and their benefits"

[3] See e.g.: http://www.jcu.edu.au/emergency/public/groups/everyone/documents/advice/jcuprd_043114.pdf, http://www.dsdip.qld.gov.au/resources/guideline/qra/planning-stronger-north-qld-part-02.pdf and practical directions to these such as http://hardenup.org/prepare-yourself/practical-preparation-advice/property-and-assets/prepare-for-cyclones/prepare-your-home-for-cyclones.aspx

[4] For example, a thoughtful analysis of ways in which such relationships can be challenging for complex long-term issues is provided by Weber & Khademian, *Public Administration Review*, March/April 2008: 334-349.

2. Responses to information requests

Are there more sophisticated models available to estimate potential future liabilities?

This could be answered at various scales and resolutions. There is potential for *ex ante* analyses such as those undertaken by CSIRO to contribute to this (see comments on page 21 above. CSIRO would be happy to provide a more detailed briefing on these studies on request). CSIRO urges the Commission to consider the need for an Intergenerational Report style appraisal to help set appropriate levels of mitigation investment.

Would additional assessment tools need to be developed?

The question here is asked narrowly. Whilst a bench-marking approach makes sense, CSIRO notes that there is limited data on the costs and benefits of mitigation activities locally, as we have found in seeking to carry out systematic modelling of the benefits of increased resilience nationally. Therefore additional processes may be needed, to embed the collection of data on the successes and failures of particular actions, as well as their costs and benefits; and these are likely in most cases to evolve over time as infrastructure, technologies and hazards change. CSIRO suggests this issue should be broadened to the processes which will enable an appropriate data base to evolve. As noted above (comments against p.19) there is a case for establishing an immediate post-disaster rapid response team that encompasses assessments for reconstruction and data collection on likely costs and benefits of previous resilience building responses.

Guidelines for the collection and dissemination of hazard mapping...?

As noted above, CSIRO suggests it would be useful for the Commission to articulate a more comprehensive architecture for the types of decisions that need different types of data (including resolution and precision) with what level of consistency, thereby defining a coherent package of data provision at 3 levels, at least (see table under comments against page 26). CSIRO would be happy to assist in developing this architecture and the specific guidelines for category 2 data collection.

We also note a need to acknowledge more strongly here (and elsewhere where reference to information on hazards is made) that information on hazards and exposure is not stationary in time (thanks to population change, infrastructure development and in view of long term climate change). Hence ongoing data collection (e.g. elevation) and monitoring (e.g. shoreline position, rainfall, sea level) is needed to understand changes in hazards and their spatial reach, particularly in relation to changing patterns of exposure and vulnerability (e.g. building locations, social characteristics of communities). As noted on Page 57, this will be likely to continue to involve "some role for governments in information gathering and provision."

This is particularly relevant in the context of flexible strategies for building resilience and adapting to changing extremes to avoid disasters. There is increasing focus on 'adaptation pathways' approaches[5] in which tipping points are identified in the response of systems to external stressors

[5] E.g. see Haasnoot, M., Kwakkel, J. H., Walker, W. E., and ter Maat, J. (2013). Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world. *Global Environmental Change* **23**, 485–498.

at which changes from one strategy (e.g. implementing soft options for coastal resilience) to an alternative strategy (e.g. hard options such as building a seawall) are made. Assessment of the performance of such strategies and key decision interventions shoudl be based on sound observations of changes to the impacts on society that are caused by climate and marine hazards. An example is coastal mapping and shoreline position, noting also the importance of observations within estuaries where flooding from the combination of river and ocean can occur. Mapping of shoreline position and coastal elevations (both above and below sea level) is needed to monitor changes of the impact of hazards at the coast and within estuaries over time and the impact on coastal risk and also to develop coastal response models that can be used to assess future impacts of climate hazards. Similar concerns could be outlined for most other hazards.

Are there barriers to insurers recognising property-level mitigation...?

As discussed above (comments against page 22) the issue is not only barriers to insurers recognising property-level mitigation, but signals to property owners to understand how they can respond to the subsequent price signals.

Wise, R. M., Fazey, I., Stafford Smith, M., Park, S. E., Eakin, H. C., Archer Van Garderen, E. R. M., and Campbell, B. (2014). Reconceptualising adaptation to climate change as part of pathways of change and response. *Global Environmental Change* **28**, 325-336