

SOAC 2015

Disaster risk reduction and urban planning: a case of uneven mainstreaming?

Alan March¹ and Stephen Dovers²

¹ University of Melbourne

² Australian National University and Bushfire and Natural Hazards CRC

Abstract

The risks of disasters pose many ongoing challenges for settlements in Australia. The emergence of threats stemming from climate change are combining with ongoing population growth, alongside the development and application of new techniques and treatments that address risk reduction. Urban planning and design operates at the interface between emerging threats and human responses that are manifest in physical modification of settlements and the populations living in and using them. In keeping with this challenge, the development of new scientific understandings and design responses offers the possibility that new approaches can be developed that are suitable utilization by the urban planning and design disciplines. However, the application of new methods and understandings has often proven to be uneven and sporadic, at the expense of improvements to the resilience of Australian cities. In response, this paper examines the value of *mainstreaming* as a way of delivering resilience improvements in the practices of urban planning and design. This paper reports the findings of investigations into successful cases of mainstreaming in Australian disaster risk reduction.

Introduction

Disasters pose ongoing risks for Australian cities that will continue to change over time. Threats will emerge from climate change and population growth, in conjunction with the development and application of new techniques and treatments that address risk reduction. Urban planning and design will play an important role in the quest for urban resilience, working at the interface between emerging threats and human responses that are manifest in physical modification of settlements and the populations living in and using them. In keeping with this challenge, the development of new scientific understandings and design responses offers the possibility that new approaches can be developed that are suitable for utilization by the urban planning and design disciplines.

However, the application of new methods and understandings has often proven to be uneven and sporadic, at the expense of improvements to the resilience of Australian cities. In response, this paper examines the value of *mainstreaming* as a way of delivering resilience improvements in the practices of urban planning, design and related areas such as engineering and public administration. The concept of mainstreaming is increasingly seen as a way of integrating new approaches or techniques developed at smaller scales, in abstract science, or that have previously had limited take-up, at a larger scale to derive wider benefits. Mainstreaming encompasses attempts to gain wider acceptance of ideas and understandings in populations, adoption of practices by specific or targeted groups, or integration of techniques or systems into pre-existing processes of governments. This paper reports the findings of initial investigations into mainstreaming in Australian disaster risk reduction. It argues that successful mainstreaming in urban planning is dependent upon nuanced approaches that pragmatically manage challenges of public and professional perception, generalizability, specificity, application of evidence, enforceability and delivery of information.

We argue that while (i) disaster policy and emergency management has evidenced an (albeit slow and uneven) 'mainstreaming' over recent decades that broadens the scope and proactivity of policy and management approaches and admits a greater range of risks and actors, (ii) urban planning has not 'mainstreamed', or incorporated responses to a broader array of risks and actors, to the same extent. Developing a generalized matrix defined by speed of onset and scale of consequence, it is suggested here that planning has incorporated more of what we categorise here as slow onset-low consequence and rapid onset-high

consequence risks *rather than* slow onset-high consequence and rapid-onset risks. After discussing urban risks and planning, we introduce this matrix and illustrate through the contrasting examples of fire and heatwaves.

Urban Risks

Urban areas represent an exceptional level of investment in resources, human labour and culture. Cities, towns and urban regions are associated with many of the benefits, and drivers, of human life as we now experience them, including creativity, social opportunity, life opportunities and prosperity, even while they are linked with many of the greatest challenges (Hollis, 2013). With increasing urbanization, the full dimensions of the benefits and problems associated with increases in urban areas are now becoming more apparent. One the one hand are the various arguments that associate increased urban density and coalescence with improved efficiency of public transport, provision of utilities and public services, minimization of ecological impacts, and improved wealth (Newman & Kenworthy, 2000) (Hollis, 2013). On the other hand is recognition that increased size does not always lead to economies of scale along various dimensions, that equity often suffers in large scale cities, that quality of life and experience may suffer, and that our impacts on the environment are often profound when humans group together in large urban conurbations that are poorly designed (Buxton, 2000; Buxton, Goodman, & March, 2012; Mees, 2003).

While resilience is one of the most important recent concepts to emerge relating to urban function, particularly as an organizing principle, its application to the critique, design, maintenance, regulation and delivery of urban areas remains a work in progress. Newton and Doherty (2014) identify the intertwined relationships between urban resilience and sustainability. They identify a number of key areas that challenge the sustainability and resilience of growing human settlements. These include seven *exogenous* pressures:

- Resource constraints;
- Climate change;
- Extreme events
- Population change;
- Urbanisation and intensification of urban development;
- Biosecurity; and
- Financial uncertainty (Newton & Doherty, 2014: 7-12).

In terms of *Endogenous* factors, they set out the following five pressures:

- Vulnerable infrastructure;
- Socio demographic change;
- Social and human capital;
- Urban economic base;
- Urban environmental quality (Newton & Doherty, 2014: 13-16).

These factors intertwine with drivers of change *and* substantive aspects of urban hazards that contribute to overall risk profiles. In this paper, we use the concept of risk reduction as an organizing principle to more directly examine risks and examine the ways that resilience may be examined in parallel with the solutions offered by urban planning, particularly as new evidence and approaches become available.

Risk is loosely defined as the chance that an undesirable outcome might occur (ISO31000, 2009). These undesirable outcomes could include matters such as loss of money or economic instability, injuries or loss of human life, or damage to infrastructure or the environment. Risk is often expressed as the function of hazards by vulnerability. Hazards are the sources of potential harm themselves, such as tsunamis, floods, cyclones or bushfires. Importantly, hazards in and of themselves are not necessarily risky. Rather, as highlighted by the definition above, hazards are risky due to interactions with vulnerable elements. Hence, a cyclone is a high risk for an unprepared population that lives in a cyclone prone area, in houses that are not built to standard and without appropriate emergency warning and response measures. This view, as pointed out by Walmsler and as used in this paper, is slightly different to the climate change literature (Wamsler, 2014), which sees vulnerability as an outcome, whereas the disaster literature locates the ability to adapt within measures to

reduce vulnerability, seeking conscious assessment and reduction of risk to an acceptable level as the key outcome.

The fundamental concepts expressed above suggest a particular way of looking at urban areas: that they embody vulnerabilities to particular hazards, and that they represent particular risk profiles. Further, it directly suggests that the vulnerability of an urban place can be actively modified by adaptive actions resulting in risk reduction. In this paper, we suggest that urban planning can play a key role in this, particularly in terms of taking action that relates to long time scales, even while the possibilities are not yet fully taken up.

Urban Planning and Risk Reduction

Land use planning seeks to put in place advantageous spatial arrangements of various activities and uses, physical structures, and the ongoing management of these systems (March & Henry, 2006). As a result, planners seek to influence, along with many others involved in urban and regional systems, the location, characteristics of housing, industry, agriculture, conservation, and transportation areas (Albrechts, 2004: 745). The “product” of planners’ work is beneficial urban and regional outcomes, based on analysis of existing and proposed plans (at various scales), regulations and establishment of process around the production of these to achieve goals. A fundamental aspect of urban planning then, is the consideration and influence of decision making (Stein, 1974: CH2) regarding urban and regional places to achieve the most advantageous and, in this case, least risky outcomes. This must occur even when planning is inevitably carried out in situations of ‘imperfect foresight’ (Hopkins, 2001: 7). A guiding principle that can be employed here is that planners seek to facilitate the making of “current decisions in the light of their future effects” (Reeves & Coile, 1984: 456), and in this case, to lower risks by reducing vulnerability.

Traditionally, the natural world has been seen as the source of threats, whereas the understanding is now widespread that it is the interactions between humans and various hazards that results in risks and the consequences of these being left untreated (Cardona, 2004). Further, the interrelationships between hazards, risks and contextual factors are increasingly understood in more complex ways, oriented towards finding appropriate means for treatment of risks, and the different realms of action needed for those treatments. For example, disasters were traditionally seen as requiring response actions alone, resulting in quasi-militarily styled agencies such as fire and emergency services (Krolik, 2013). Ill-health has been understood in terms of disease and the provision of western medical treatment; poverty as treatable by investment to transition economies to a developed state (Bankoff, 2004); and, risks and their treatments being understood from individual, rather than collective, social and long term perspectives (Cardona, 2004). We argue here that there is a need to reconceptualise risks in urban and regional areas in ways that facilitate urban managers being able to treat them.

Importantly, there has been a slow and uneven but steady recasting of definitions and responses in disaster policy, and a subsequent move to whole-of-government and whole-of-society (mainstreamed) approach (Dovers & Handmer, 2014). The key international policy platforms of Hyogo and Sendai (see below) from 2000 have recast disasters as central to a broader human development agenda, and in emergency management in Australia and elsewhere key concepts of ‘shared responsibility’ and ‘disaster resilient communities’ and a greater proactivity away from simply response is evident in policy and practice, and reflected in the National Strategy for Disaster Resilience (Wilkins & McCarthy, 2011). Planning is prominent amongst those arenas of policy and practice now understood as central to disaster risk reduction. Instead of an overwhelmingly agency-dominated *response* orientation, more attention is being paid to the other three elements of the emergency management spectrum of PPRR (prevention-preparedness-response-recovery), and a focus on reducing vulnerability.

A number of recent examples of the recasting of risks, hazards and treatments exist in Australia. The recognition of end-of-oil risks playing out spatially and having multiple implications for vulnerability and loss of transport equity has revealed many shortcomings in

the design of our cities and provision of services (Dodson & Sipe, 2008). Recognition that a number of non-communicable diseases are associated with obesity and with car based suburbs has led to recognition that many impacts of poor health, including a significant burden upon the health and welfare system, also suggest that urban planning needs to address car based travel, in association with modifying land use mix and densities (NHMRC, 1997). Impacts of heat islands upon human health, energy use and habitat impacts in highly built up areas has led to significant actions being taken to try to avoid losing vegetation and to “green” built up areas. Recognition that over 70% of structure fires during bushfires are the result of ember attack, rather than direct flame contact or ambient heat, has led to new approaches that do not rely on mass vegetation clearing, but rather, use more nuanced methods that integrate improved materials and means to maintain building envelop integrity, along with public education about property maintenance. Recent understandings have emerged that centralised provision of infrastructure systems are often highly “brittle” and prone to widespread impacts when key elements fail. For example approximately 40 million homes in the US were left without power for significant periods after a cascading infrastructure breakdown in 2003 with widespread health and economic impacts. This led to new approaches using decentralised and distributed systems that are less prone to failure (Flynn & Burke, 2011).

While these are just a few examples, it is contended that the effects of risks in urban areas can be anticipated and reduced by re-directing our approaches to land use planning. Risks can be significantly reduced through concerted and long-term actions that begin with making a wider appraisal of risk factors. The challenge is the mechanisms used to develop and then apply new evidence relating to risks. The next section examines the concept of mainstreaming.

Mainstreaming

While new understandings and evidence are developed over time, new technologies emerge, and new challenges present themselves, the task of finding ways to introduce and integrate new risk reduction mechanisms into practical outcomes usually lags considerably.

Mainstreaming in general language is the process of bringing practices, beliefs or ideas into the wider understandings, groups and processes of society. In disaster terms risk reduction is understood as:

a governance process enabling the systematic integration of DRR concerns into all relevant development spheres (United Nations Development Program, 2010: 1).

In many ways, the modern history of urban planning could be seen as a process of seeking to mainstream many activities relating to urban and regional management as human populations have grown, migrated, technologies have developed, and economic, social and ecological processes and outcomes have been understood. Consider the health and sanitation reforms of the 19th Century, the Garden City Movement of the early 20th Century (Cullingworth & Nadin, 1994) or the integration of environmental impact assessments into land development processes during the 1960s and 70s.

Many international efforts undertaken by organisations such as the United Nations have been oriented to integration of Disaster Risk Reduction into development processes, aimed to a large extent at the developing world, recognizing the vulnerabilities associated with poverty, rapid population growth and economies and societies in transition (United Nations Development Program, 2007). This reflects a long standing recognition in the fields of disaster risk management and hazard management that efforts to manage risks are easily overwhelmed by other pressures such as growth, economic imperatives or political expedience that overwhelm or simply push aside concerns with apparently abstract risks (Smith, 2013). Ulrich Beck’s seminal work on the Risk Society suggested that a key challenge we face is to integrate the unexpected into “normal” day to day activities (Beck, 1992: 16). His ongoing work, updated to more fully address critical theory, argues that the task is one of understanding governance and collective decision making (Beck, 2008).

The highly interdependent nature of risk is increasingly recognized by the UNDP, which suggests that:

building resilient communities in disaster-prone countries requires that: a) underlying risk factors are continuously considered in all relevant sectors; and b) risk reduction standards and measures are an integral part of the planning and delivery of core development services and processes, including education, environment, and health (United Nations Development Program, 2010: 2).

The Hyogo Framework 2005-2015 set out a range of priorities for action to reduce the impacts of disasters internationally. A number of references to mainstreaming occur, particularly in relation to land use planning and design (United Nations, 2005: 12). The updated Sendai Framework more directly addresses mainstreaming as an activity of governance in *Priority 2: Strengthening disaster risk governance to manage disaster risk*, and further, sets out detailed criteria, commencing with the following:

To mainstream and integrate disaster risk reduction within and across all sectors and review and promote the coherence and further development, as appropriate, of national and local frameworks of laws, regulations and public policies, which, by defining roles and responsibilities, guide the public and private sectors (UNISDR, 2015: 14)

The Framework directly refers to land use planning and natural resource management (UNISDR, 2015: 16), linking this into technical and governance activities. A key action is to examine these in land use planning and design terms, given the breadth of risk factors. The 19 areas relating to mainstreaming are summarized below in Table 1.

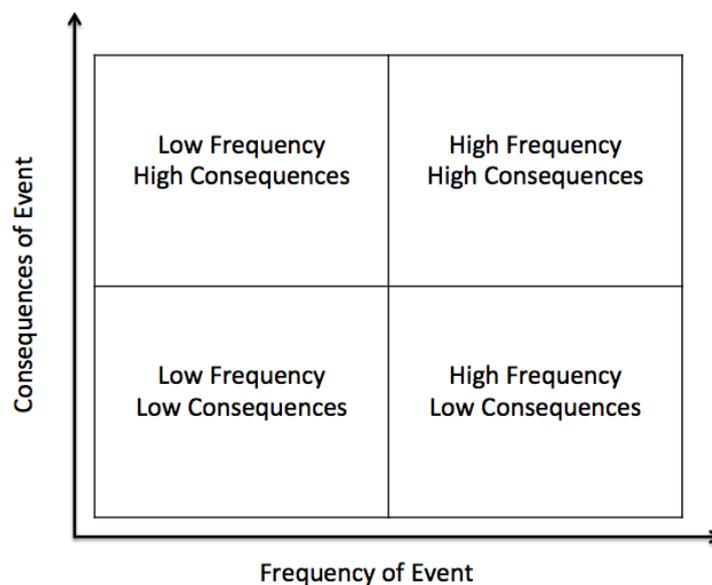
Table 1 – Summary of Sendai 2015 Framework relating to Mainstreaming of Urban Planning Mechanisms

Clause 27	Summary of DRR Mainstreaming as Relevant to Urban Planning and Relevant Governance
a	Coordinated cross sectoral action at national and local frameworks, crossing public, private household, individual, business, communities and NGO activities and interests, including infrastructure services, organisations and regulation, incentives and compliance mechanisms as appropriate.
b	Adopt and implement national and local disaster risk reduction strategies and plans, across different timescales, with targets, indicators and time frames, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience
c	Assessment of DRR capacities at all levels
d	Mechanisms and incentives for high levels of compliance and updating of planning and building codes.
e	Ongoing assessment and reporting mechanisms and mechanisms to follow up, periodically assess and publicly report on progress on national and local plans; and promote public scrutiny and encourage institutional debates, including by parliamentarians and other relevant officials, on progress reports of local and national plans for disaster risk reduction;
f	Formalisation of ongoing public and community inputs to DRR
g	Strong government coordination forums at the national and local levels, with roles in knowledge building and dissemination, with a legal basis;
h	To empower local authorities, as appropriate, through regulatory and financial means to work and coordinate with civil society, communities and indigenous peoples and migrants in disaster risk management at the local level;
i	Parliamentary support of implementation of new or amending relevant legislation and budgets
j	Development and use quality standards, certifications and awards, with the participation of the private sector, civil society, professional associations, scientific organizations and the United Nations
k	To formulate public policies, where applicable, aimed at addressing the issues of prevention or relocation, where possible, of human settlements in disaster risk-prone zones.

Table 1, while in summarized form, shows an ideal of policy development and integration with implementation mechanisms. Yet, the issue remains as to how policy cycles can “meet” emergency management and disaster risk reduction (Handmer, 2006: 49-58). The issue arises of who does what of the (a-k) in Table 1, and more specifically, what planning or planners can do, that which other actors must do, and that which planning or planners could do if enabled by other actors (such as parliaments and governments who make broader policy or enact planning laws). Achievement of the outcomes summarized above would require that detailed and ongoing actions be taken. Further, they would need to address the range of risks present in urban areas, whereas it is apparent that some types of hazard tend to be more directly acknowledged. We suggest that in urban planning and management, the predominant approach to risk management of assessing risk in terms of consequences by frequency of events has led to certain risks being emphasized at the expense of others.

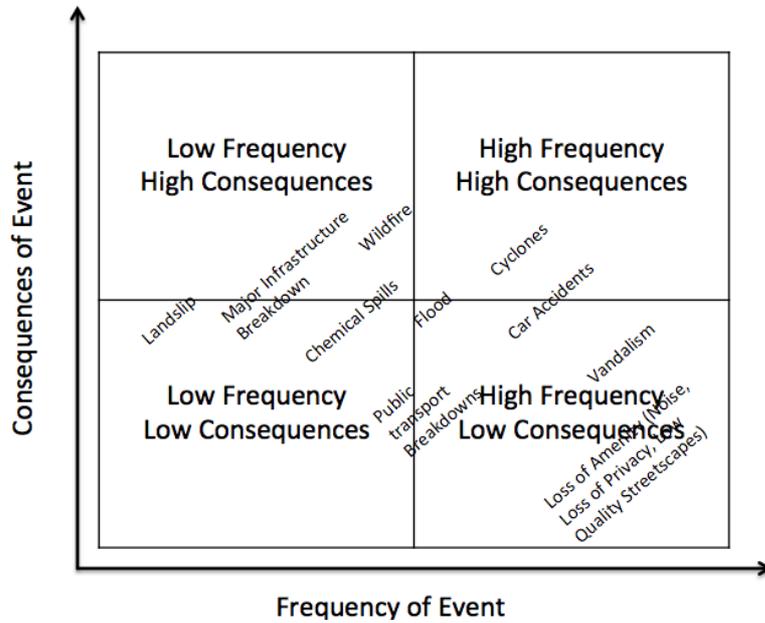
Graphically, the relationship between consequences and frequency can be shown simply as in Figure 1.

Figure 1 – Consequences by Frequency of Disaster Events



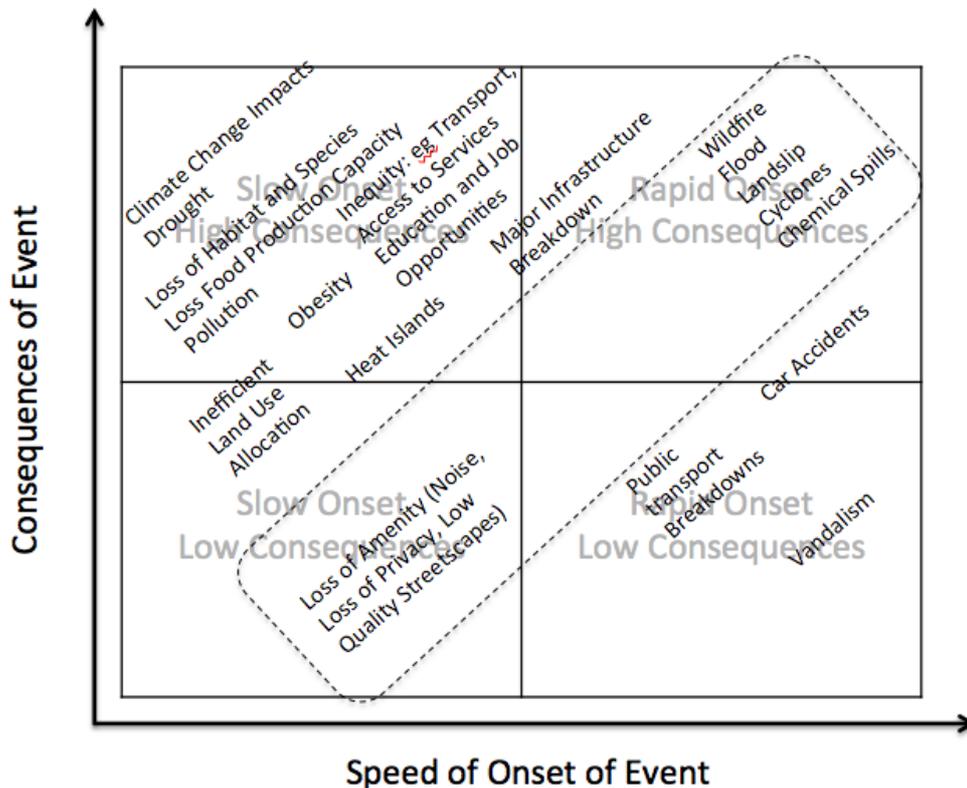
The appetite for action regarding hazards is particularly high in the case of those that are highly visible or publicized, sudden onset and high incidence events, such as wildfire (Paton & Tedim, 2012), whereas other risks may actually be much more costly or have more far reaching consequences, such as obesity, heat stress, critical infrastructure failure or economic breakdown (Wamsler, 2014). This is generally a result of human nature and traditional approaches to emergency management mainly being oriented to *response* activities (Alexander, 1999), noting however that a singular reliance on response has weakened in recent years. Some common risks experienced in urban and regional areas are mapped onto the frequency and consequence matrix below in Figure 2.

Figure 2 - Common risks in Australian Urban and Regional areas: frequency by consequence



However, this approach is somewhat confounded by emergent risks in urban areas that exist at significant time scales, and that have their origins more fully in human agency. These include: obesity; climate change impacts; loss of habitat; inequitable urban service provision; and, loss of local food production opportunities. If the axes of the risk assessment are oriented to *consequences by speed of onset of disaster*, a quite different understanding can be developed, as shown in Figure 3. This approach more fully appreciates human agency as central to dealing meaningfully with urban and regional risks, and requires forward projection to the times scales more appropriate to the time horizons associated with urban and regional planning.

Figure 3 – Urban and Regional Risks: Consequences by Speed of Onset of Events



While Figure 3 is a conceptual representation, it is significant that when some of the key risks are mapped in this way it becomes apparent that risk management in urban settlements as dealt with by urban planning and related areas pays considerable attention to a particular category of risks. In the top right quadrant, it has paid considerable attention to rapid onset, high consequence risks such as wildfire and flood, whether this has been effective or not. As will be examined below, this would seem to be a result of mainstreaming processes, particularly in the last one or two decades. In the bottom left quadrant are slow onset and low consequence risks such as loss of amenity and aesthetics, which have also been paid considerable attention. It would seem that considerable mainstreaming of these into urban planning has also occurred over a long period, stemming to a considerable extent from the traditions of architecture in urban planning and in the strong connections of urban planning into local governance. There has been, we argue, considerably less attention, and certainly less mainstreaming, of responses to risks mapped in the top left and bottom right quadrants.

Examining Mainstreaming Mechanisms: Wildfire versus Heatwaves

While an extensive description is not possible here, wildfires and heatwaves are two hazards that present significant risks in Australia. Wildfires are “unplanned” fires in vegetation that present significant risks to humans when they interact with settlements, including dwellings, infrastructure, water supplies and livestock (Holland, 2012). Heatwaves are defined as three or more days of unusually high maximum and minimum temperatures in any area (Bureau of Meteorology, 2014). The consequences of heatwaves are significant: it is the most common cause of ‘disaster’-related death in Australia, at an estimated 80 per year, expected to increase to 200 in 2050 (Price Water House Cooper, 2011). By way of comparison, a total of 173 died as a result of in the 2009 Victorian Bushfires, while 370 died from extreme heat during the week of those bushfires (Price Water House Cooper, 2011).

Our contention is that the speed of onset of hazards is a factor in the approach taken in its mainstreaming. While more extensive and detailed guides exist relating to the mainstreaming of risk reduction, for example: (Benson, Twigg, & Rossetto, 2007), the criteria of the Sendai Framework provide broad criteria for diagnosis. On this basis, Table 2 below summarises the level of take up of mainstreaming in two illustrative areas, comparing bushfire and heatwaves.

Table 2 – Summary of Sendai 2015 Framework relating to Mainstreaming of Urban Planning Mechanisms: Assessment of Achievement in Wildfire versus Heatwaves

Summary of DRR Mainstreaming: as Relevant to Urban Planning and Relevant Urban Governance					
a	Coordinated cross sectoral action at national and local frameworks, crossing public, private household, individual, business, communities and NGO activities and interests, including infrastructure services, organisations and regulation, incentives and compliance mechanisms as appropriate.				
	<table border="1"> <thead> <tr> <th>Wildfire</th> <th>Heatwaves</th> </tr> </thead> <tbody> <tr> <td>Concerted attempts to bridge gaps in policy relating to cross sectoral risk factors and opportunities. Most oriented to broad outcomes and fuel reduction schemes around settlements. Recovery of key areas impacted, while using development control to improve housing stock over time.</td> <td>Some recognition of risks at national and state level (although not in the COAG National Disaster Resilience Strategy). Limited action taken, despite significantly greater consequences historically. Limited recognition of the positive actions that could be taken using urban planning and building controls, inter-relating with energy, social services, health and other sectors.</td> </tr> </tbody> </table>	Wildfire	Heatwaves	Concerted attempts to bridge gaps in policy relating to cross sectoral risk factors and opportunities. Most oriented to broad outcomes and fuel reduction schemes around settlements. Recovery of key areas impacted, while using development control to improve housing stock over time.	Some recognition of risks at national and state level (although not in the COAG National Disaster Resilience Strategy). Limited action taken, despite significantly greater consequences historically. Limited recognition of the positive actions that could be taken using urban planning and building controls, inter-relating with energy, social services, health and other sectors.
Wildfire	Heatwaves				
Concerted attempts to bridge gaps in policy relating to cross sectoral risk factors and opportunities. Most oriented to broad outcomes and fuel reduction schemes around settlements. Recovery of key areas impacted, while using development control to improve housing stock over time.	Some recognition of risks at national and state level (although not in the COAG National Disaster Resilience Strategy). Limited action taken, despite significantly greater consequences historically. Limited recognition of the positive actions that could be taken using urban planning and building controls, inter-relating with energy, social services, health and other sectors.				
b	Adopt and implement national and local disaster risk reduction strategies and plans, across different timescales, with targets, indicators and time frames, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience				
	<table border="1"> <thead> <tr> <th>Wildfire</th> <th>Heatwaves</th> </tr> </thead> <tbody> <tr> <td>A number of well developed policies at national level, but with limited and highly uneven translation to local action. Strong</td> <td>Limited policy development at national level, with varied policy and action at state and local government level. Some efforts</td> </tr> </tbody> </table>	Wildfire	Heatwaves	A number of well developed policies at national level, but with limited and highly uneven translation to local action. Strong	Limited policy development at national level, with varied policy and action at state and local government level. Some efforts
Wildfire	Heatwaves				
A number of well developed policies at national level, but with limited and highly uneven translation to local action. Strong	Limited policy development at national level, with varied policy and action at state and local government level. Some efforts				

State of Australian Cities Conference 2015

	state level activity, imposed upon local implementation systems. A number of concerted efforts to integrate actions, but a strong focus on response and building actions.	at gathering empirical data from disparate sources eg (Price Water House Cooper, 2011; Bureau of Meterology, 2014)
c	Assessment of DRR capacities at all levels	
	Wildfire Extensive assessment after 2009 Victorian and other fires, resulting in shared responsibility and other related campaigns.	Heatwaves Some limited assessment.
d	Mechanisms and incentives for high levels of compliance and updating of planning and building codes.	
	Wildfire Strong orientation to regulation, enforceable via statutory controls that embrace building and planning controls, despite any shortcomings. Limits to political will to implement new bushfire mapping.	Heatwaves Minimal action taken.
e	Ongoing assessment and reporting mechanisms and mechanisms to follow up, periodically assess and publicly report on progress on national and local plans; and promote public scrutiny and encourage institutional debates, including by parliamentarians and other relevant officials, on progress reports of local and national plans for disaster risk reduction;	
	Wildfire Initial enthusiasm at state level, including parliamentarian sympathies. However, ongoing periodic efforts are actually undertaken. Establishment of working groups, on an ad hoc and sporadic basis, as political issues arise.	Heatwaves Limited assessment actions.
f	Formalisation of ongoing public and community inputs to DRR	
	Wildfire At national level, considerable formalization of language, information and processes by AFAC and Attorney General's office, for subsequent adaptation by state based authorities. At state and local level many ad hoc working groups regarding policy production, but no ongoing formalized inputs at local level into planning and building. Inputs are related to minor details, rather than overarching issues, particularly in development control.	Heatwaves Limited action.
g	Strong government coordination forums at the national and local levels, with roles in knowledge building and dissemination, with a legal basis;	
	Wildfire Extended networks of scientists, policy makers and building practitioners, with state level coordination groups. Little local interaction and input – limits to local existing knowledge, and challenges to its development, although some formal training is provided	Heatwaves Limited action. Some research into heat island effects, impacts of SES, pre-existing conditions and energy efficiency: but limited translation into integrated action, particularly in urban planning.
h	To empower local authorities, as appropriate, through regulatory and financial means to work and coordinate with civil society, communities and indigenous peoples and migrants in disaster risk management at the local level;	
	Wildfire Most planning and building controls are state or nationally established. The only local inputs allowed are to do with non-planning mechanisms, after planning rules	Heatwaves Limited action

	established.	
i	Parliamentary support of implementation of new or amending relevant legislation and budgets	
	Wildfire New legislation and statutory planning regulations introduced alongside new planning policies being implemented to allow vegetation clearing and requiring certain building standards.	Heatwaves Limited action.
j	Development and use of quality standards, certifications and awards, with the participation of the private sector, civil society, professional associations, scientific organizations and the United Nations	
	Wildfire Use of certification and Australian Standards, accreditation schemes of practitioners, and acknowledgement of high quality works. Strong role of CSIRO in fundamental science. Sporadic use of civil society.	Heatwaves Limited use of standards, except in parallel actions, such as those seeking energy efficiency or health care.
k	To formulate public policies, where applicable, aimed at addressing the issues of prevention or relocation, where possible, of human settlements in disaster risk-prone zones.	
	Wildfire Many recent public policies achieving prevention, but few dealing with existing areas, and very limited concerted effort in existing areas.	Heatwaves While some recognition of the centrality of urban form and the need for integrated action (Victorian Council of Social Service, 2013) limited concerted action is taken.

Conclusions - Actively Mainstreaming Urban Risks

It has been shown above that while heatwaves are a significant and increasingly risky hazard with significant consequences, particularly in relation to built up areas and in association with climate change, there has been little activity toward mainstreaming it into urban planning and related areas, such as architecture, building, landscape architecture, and urban design. This is consistent with our (Figure 3) proposition that mainstreaming of risk into planning has been uneven. Of course, hazards such as wildfire have been acknowledged as an area to be addressed through urban planning and management systems for a significant period of time. Further, risks such as wildfire and flood are more apparent in their physical manifestations and are more spatially particular. Hazards such as heatwaves, obesity and some climate change impacts are more recent, and are only apparent as public risks upon extensive data collection and analysis. Further, the urban planning solutions to risks such as these are only clear after extensive modeling and scenario testing, alongside the integration of a number of other mechanisms in other disciplinary and regulatory areas. So while there is a clear need to mainstream action regarding these risks, there is also a need to acknowledge that mainstreaming of hazards such as these will include meeting the particular challenges associated with perceptions and the manifestation of these risks.

Mainstreaming is particularly challenging for a hazard such as heatwaves due to its diffuse manifestation and reliance on analysis to demonstrate these risks. However, beyond this, we argue that one key defining characteristic appears to be associated with lower levels of mainstreaming – the *speed of onset*. Slow speeds of onset have many dimensions that provide challenges to risk reduction action, but two are particularly so for urban planning: the apparent absence of urgency to act; and, diffuse causality. For example, the drivers for heatwave consequences are both endogenous and exogenous, spanning climate change, variable SES vulnerabilities, the management of urban processes and structures, and delivery of health and welfare services. It is relatively easier for decision makers to delay action on risks such as these because they may seem abstract and the solutions to them disparate, by comparison to action oriented to high-consequence sudden-onset hazards, such as wildfire.

Beyond the single example of heatwaves, we argue that research and action fully exploring

the mechanisms for mainstreaming high-consequence but slow-onset risk reduction is required. It is important to seek ways that urban planning can more fully embrace its potential to address long term problems, and to represent the development and deployment of an evidence and action base that can stand outside of, or beyond, the characteristics of particular governmental regimes. Urban planning is particularly challenged by this, being by definition an act of collective governance. However, the development of clear evidence and provision of regulatory and implementation for mainstreaming are clear initial projects that can begin to address this problem of breaking out of current path dependencies.

- Albrechts, L. (2004). Strategic (Spatial) Planning Reexamined. *Environment and Planning B: Planning and Design*, 31, 743-758.
- Alexander, D. E. (1999). *Natural Disasters* London: Kluwer.
- Bankoff, G. (2004). The Historical Geography of Disaster: 'Vulnerability' and Local Knowledge" in Western Discourse. In G. Bankoff, G. Frerks, & D. Hilhost (Eds.), *Mapping Vulnerability: Disasters, Development and People*. New York: Earthscan.
- Beck, U. (1992). *Risk Society: Towards a new modernity* (M. Ritter, Trans.). London: Sage.
- Beck, U. (2008). World at Risk: The New Task of Critical Theory. *Development and society*, 1, 1-21.
- Benson, C., Twigg, J., & Rossetto, T. (2007). Tools for Mainstreaming Disaster Risk Reduction: Guidance Notes for Development Organisations. Switzerland: International Federation of Red Cross and Red Crescent Societies / the ProVention Consortium.
- Bureau of Meteorology. (2014). Special Climate Statement 48 – one of southeast Australia's most significant heatwaves: Bureau of Meteorology.
- Buxton, M. (2000). Energy, Transport and Urban Form in Australia. In K. Williams, E. Burton, & M. Jenks (Eds.), *Achieving Sustainable Urban Form* (pp. 54-63). London: Spon.
- Buxton, M., Goodman, R., & March, A. (2012). Planning systems, Urban Form and Housing. In R. Tomlinson (Ed.), *Australia's Unintended Cities: The Impact of Housing on Urban Development*. Canberra: CSIRO Publishing.
- Cardona, O. (2004). The Need for rethinking the Concepts of Vulnerability and Risk from a Holistic Perspective In G. Bankoff, G. Frerks, & D. Hilhost (Eds.), *Mapping Vulnerability: Disasters, Development and People*. London: Earthscan.
- Cullingworth, & Nadin. (1994). *Town and Country Planning in Britain* (11th ed.). London: Routledge.
- Dodson, J., & Sipe, N. (2008). *Shocking the Suburbs: Oil Vulnerability in the Australian City*. Sydney: University of New South Wales Press.
- Dovers, S., & Handmer, J. (2014). Disaster Policy and Climate Change: how much more of the same? In A. Ismail-Zadeh, J. U. Fucugauchi, & K. Takeuchi (Eds.), *Extreme Natural Hazards, Disaster Risks and Societal Implications*. Cambridge: Cambridge University Press.
- Flynn, S., & Burke, S. (2011). Brittle Infrastructure, Community Resilience, and ational Security. *Transportation Research*, 275(July-August), 1-18.
- Handmer, J. and Dovers, S. (2006). *Handbook of Disaster Policies and Institutions* London: Earthscan.
- Holland, M., March, A., Yu, J., Jenkins, A. (2012). Land Use Planning and Bushfire Risk: CFA Referrals and the February 2009 Victorian Fire Area. *Urban Policy and Research*.
- Hollis, L. (2013). *Cities are Good for You: The Genius of the Metropolis*. London: Bloomsbury.
- Hopkins, L. D. (2001). *Urban Development: The logic of making plans*. Washington: Island Press.
- ISO31000. (2009). AS/NZS ISO 31000:2009: Risk management - Principles and guidelines Standards Australia.
- Krolik, M. (2013). Exploring a rights-based approach to disaster management. *Australian Journal of Emergency Management*, 28(4), 44-48.
- March, A., & Henry, S. (2006). *A better future from imagining the worst: land use planning & training responses to natural disaster*. Paper presented at the Joint PIA and NZPI Congress, Gold Coast, Queensland.
- Mees, P. (2003). Paterson's Curse: The Attempt to Revive Metropolitan Planning in Melbourne. *Urban Policy and Research*, 21(3), 289-301.

State of Australian Cities Conference 2015

- Newman, P., & Kenworthy, J. (2000). Sustainable Urban Form: The Big Picture. In K. Williams, M. Jenks, & E. Burton (Eds.), *Achieving Sustainable Urban Form*. London: Spon.
- Newton, P. W., & Doherty, P. (2014). The Challenges to Urban Sustainability and Resilience. In L. J. Pearson, P. W. Newton, & P. Roberts (Eds.), *Resilient Sustainable Cities: A future*. New York: Routledge.
- NHMRC. (1997). Acting on Australia's weight: A strategic plan for the prevention of overweight and obesity: NHMRC.
- Paton, D., & Tedim, F. (Eds.). (2012). *Wildfire and Community*. Illinois: Charles C Thomas.
- Price Water House Cooper. (2011). Protecting human health and safety during severe and extreme heat events: Commonwealth Government of Australia.
- Smith, K. (2013). *Environmental hazards: assessing risk and reducing disaster* (6th ed.). New York: Routledge.
- Stein, L. A. (1974). *Urban Legal Problems*. Sydney: The Law Book Company.
- UNISDR. (2015). Sendai Framework for Disaster Risk Reduction 2015-2030. Sendai: UNISDR.
- United Nations. (2005). Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. Hyogo: United Nations: International Strategy for Disaster Reduction.
- United Nations Development Program. (2007). Geneva: United Nations Development Programme.
- United Nations Development Program. (2010). Disaster Risk Reduction, Governance & Mainstreaming. New York: UNDP Bureau for Crisis Prevention and Recovery.
- Victorian Council of Social Service. (2013). Feeling the heat: Heatwaves and social vulnerability in Victoria: Victorian Council of Social Service.
- Wamsler, C. (2014). *Cities, Disaster Risk and Adaptation*. Abdingdon: Routledge.
- Wilkins, R., & McCarthy, M. (2011). National Strategy for Disaster Resilience: Building our nation's resilience to disasters: National Emergency Management Committee.