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Urban Planning for Disaster Risk Reduction: Establishing 2nd Wave Criteria

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Abstract

It is increasingly common for governments to seek integration of urban planning and disaster risk reduction (DRR) processes, in recognition of the deep connections between human settlements and risk profiles relating to disasters. This paper sets out a conceptual framework critically assessing the potential to integrate aspects of urban planning and disaster risk reduction. Urban planning seeks to favourably influence the spatial and functional organisation of cities and regions. It has developed from multiple traditions across design, health, law social action and economic development. It now has established legislative, agency, governmental and professional bases that provide legitimacy and frameworks for action. In contrast, disaster risk reduction (DRR) is relatively new, and is derived from emergency management traditions based primarily in the development of systems oriented to responding to large scale disaster events, such as flood, fires and storms. The professional base of DRR, currently being reconceived, derives from multiple sources including the sciences, disaster research, and response and other civil agencies. This paper argues that to meaningfully integrate planning and DRR, it is necessary to understand their fundamental qualities. A framework of six categories is set out to demonstrate the key points of intersection between urban planning and DRR. The paper argues that the integration or otherwise of urban planning can be understood as one indicator of a transition to Wave 2 of DRR and establishes key propositions to determine this. The paper concludes with an assessment of the challenges and potentials of integrating urban planning and DRR.

Key words: Cities, Urban Planning, Disaster Risk Reduction, Disaster Risk Management, Emergency Management.

Introduction

Cities face increasing risks of impacts from large scale disasters (Ammann, 2012). This is a result of the inter-relationships between larger cities and their surrounds, the increasing frequency of disasters, and the impacts of cities themselves upon the natural and human systems in which they are located. Urban planning, based in seeking to advantageously modify the arrangements, functions and management of cities and regions, has a clear role in finding ways to ameliorate disasters. While there has been long standing commitment, at least conceptually and in policy, to further develop urban planning's potential to reduce the likelihood and impacts of disasters, it has been difficult to translate this to practice. In the Australian setting, for example, there are documented references to the role of planning in reducing disaster risks since at least the 1938-39 Victorian Bushfires. Despite this, little systematic take-up has occurred until recent times (National Emergency Management Committee, 2012).

Urban planning has developed from a range of disciplines including design, health, law, social reform and economic management. With its grounding, at least in most developed countries, in legislative, agency, governmental and professional fundamentals, it has established legitimacy as a base for action. However, disaster risk reduction (DRR) is relatively new, being derived from the older

emergency management tradition oriented mainly to disaster response, what we would describe as the 1st Wave of DRR, but which now seeks to act across a range of areas in addition to the response phase (Pearce, 2003). There is currently an ongoing need to find ways that urban planning in cities can improve approaches to urban planning for disaster risk reduction. While some emerging examples do exist of urban planning being integrated with disaster risk reduction practices, there is no wider set of principles guiding this. The Intergovernmental Panel on Climate Change (IPCC) 2012 report acknowledges the importance of urban planning being integrated with risk reduction practices (p. 460), but actually developing ways of achieving this integration still remains challenging. While ongoing calls to improve resilience continue to be made, this paper seeks to examine the fundamental connections between disaster risk profiles and the ways that humans build and manage their settlements. Developed from a synthesis of key literature in the disaster and urban planning disciplines, the paper presents a conceptual framework for assessment of the type and level of integration of urban planning with disaster risk reduction. It is argued that integration of planning and DRR requires understanding and resolution of their particular and sometimes contrasting qualities. The paper sets out a framework of six categories to illustrate key points of intersection and divergence between urban planning and DRR, arguing that a transition to a "2nd Wave" will integrate DRR and Urban Planning more fully, and that this can provide clearer ways to develop resilience.

A "Second Wave" Convergence of Approaches in Planning for DRR?

Disasters are traumatic events that seriously disrupt the normal functioning of communities or societies, provoking large scale human, material, economic or environmental losses (UNISDR, 2009, Nicholls, 2010). Disasters have often been categorised into two main types, according to their apparent origin: technological events caused by the failure of manmade systems (Weisaeth, 1994); and, "natural" events resulting from the physical environment's impacts upon human system elements, understood as extraneous forces such as wildfire, flood, hurricane and so on (Burton et al., 1978). Despite the relative convenience of the term "natural" contemporary consensus has now shifted to acknowledging that disasters' ultimate causes lay with humans and their impacts upon and interactions with the natural environment. Any disaster's origins lay in the relationships between the cultural, social, political and economic conditions affecting a place (Oliver-Smith, 2002, Pelling, 2003, Mileti, 1999). So, while the "natural" environment might have delivered the impact of a flood, for example, it might also be argued that factors such as clearing of vegetation and location of a settlement in a floodway are the real origins of the disaster and its impacts. Accordingly, more socially-oriented approaches can be discerned in DRR over time. Mileti (1999) for example, emphasizes the role of culture (attitudes, values and behaviors) in the creation of disasters. Hewitt (1983a, quoted by McEntire, 2004) argues that catastrophes reflect the ongoing social order, such as poverty in many developing countries being a key factor (McEntire, 2004). Recognising the need to understand the social and human aspects of disasters, Handmer and Dovers set out an institutional view, examining the processes and frameworks required in terms of policies and institutions (2007). Taking a similar view, the following sections set out main principles focused upon features most relevant to integrated urban planning and DRR.

To begin, two main definitions of *risk* can be found in DRR: (1) the combination of a hazard's likelihood and consequences -see for instance (Coppola, 2011, Adger, 2006); and (2) the combination of a hazard and the vulnerability characteristics of an affected population (Blaikie et al., 1994, Birkmann, 2006). Hazards are understood as any potential threats (with external natural or manmade causes) to social, infrastructural, and environmental components, within a defined context (Oliver-Smith, 2002, Cutter, 2003). Vulnerability refers to the pre-disaster conditions (human or environmental) that can affect the impact and consequences of it (Cutter et al., 2008, UNISDR, 2009). This contrasts with resilience, which is in effect the opposite of vulnerability, i.e. the capacities of a system to decrease the impact of a hazard, by resisting it and maintaining basic functions during it,

and in recovering or 'bouncing back' after the event, adapting to and capitalizing post-disaster opportunities (Godschalk, 2003, Twigg, 2007, Beatley, 2009).

In a wider societal sense, risks are potential impacts *upon* people and places, but this view is problematically disconnected from the normal, ongoing, activities of modern systems oriented to production, possession or growth (Beck, 2008). The connection between the cultures of normalcy and the state of exception need to be bridged (Beck, 2009) to account for disaster risk across disciplinary areas, such as urban planning. Indeed, greater convergence between planning and DRR approaches can be seen in more recent understandings of resilience. As a risk reduction strategy, resilience is increasingly understood as a process that should be simultaneously developed across multiple overlapping dimensions (2008), such as the built environment, governance networks, social dynamics, and production, supply and consumption chains (Resilience Alliance, 2007). Building resilience requires accounting for a range of different temporal and spatial scales, such as slow onset events (e.g. sea level rise, droughts, famines) vs. rapid onset events (e.g. hurricanes, earthquakes, tsunamis), and large-scale global processes (e.g. global warming) vs. localized and event-specific impacts (Cutter et al., 2008). Birkmann (2006) points out that vulnerability reduction (i.e. increasing resilience) should be developed for the pre-disaster stage, but also for optimizing the responses when the disaster occurs.

Here, we argue that a partial transformation of approaches can be discerned in the links between urban planning and DRR, where understandings of risk are increasingly being integrated within the wider processes of urban planning. The research project undertook a review of key literature sources that dealt with the principles underlying fundamental factors affecting process and outcome success in the disaster and urban planning disciplines. The points of convergence were themed and assessed in terms of compatibility. This paper presents the resulting conceptual framework that can be used for assessment of the type and level of integration of urban planning with disaster risk reduction. The key points of intersection between urban planning and DRR are set out below, across six main categories: (1) modes of action and processes; (2) institutional settings (3) knowledge, intelligence and decisions; (4) temporal scales; (5) spatial scales; (6) coordination and social Integration. The following sections address these in turn, concluding with descriptions of Wave 2 as the integration of DRR and urban planning, providing outlines for further action and research to explore 2nd Wave as a way to improved risk reduction.

Modes of Action – a Tendency to Process *and* Outcome

Planning and DRR both rely on a range of similar modes of action that provide capabilities to achieve a range of goals. Urban planning has a substantive emphasis towards seeking advantageous future physical, social, economic and ecological outcomes in cities and regions, drawing a range of action modes and delivery mechanisms together. In DRR, a broad shift in approaches can now be discerned from the Cold War Era's reaction and relief approaches (usually known as Emergency Management) to contemporary forward-oriented and proactive risk-reduction strategies (Pearce, 2003, Tarrant, 2006). Disaster management is now generally understood as a process with four interrelated stages (Coppola, 2011, Topping, 2011): *mitigation* or *plan* (reducing or eliminating the likelihood or consequences of natural or human-caused hazards), *preparedness* (minimizing the impact of hazards, under unaltered risk conditions), *response* (taking action cope with an actual disaster), and *recovery* (dealing with the aftermath and returning to "normal", hopefully taking advantage of post-disaster opportunities). This is often referred to as the PPRR model. Even while these descriptions suggest that activities are relatively discrete, mitigation, also referred as the action of *disaster risk reduction* to human life and properties (FEMA, 2002, Coppola, 2011) is best understood as a continuous long-time effort, which can be developed at any time (Topping, 2011, Beatley, 2009, Handmer and Dovers, 2007).

The integration of multiple modes of action is key to strengthening the importance of land use planning and of DRR. Burby (1998) underlines the flaws of single approaches to dealing with disasters. For example, warnings are not completely effective, because many people don't receive or obey them, and in many times risks are not always accurately estimated. Relief and insurance, in turn, can foster excessive exposure to risk. Structural hazard reduction, finally, can be costly and may fail, particularly when excessive reliance is placed on engineered solutions alone. In contrast, DRR attempts to develop a range of approaches across multiple activity modes, that can draw on a number of disciplines. We argue here, as summarized in Table 1 below, that integration across agencies and modes of action is necessary for a full transition to planning's integration with DRR.

Table 1 - DRR & Urban Planning - Modes of Action

1st Wave	Processes seen as separate, but a range of formal and ad hoc interactions occur between agencies and jurisdictions to find opportunities for integration, often in the wake of a disaster event.
2nd Wave	Urban Planning and DRR functions integrated across the full range of processes and within key activities across disciplines to reduce risks in most effective mode way. Eg bushfire risk assessment increasingly integrated into processes of forward planning and response agencies, with a range of approaches integrated such as forward strategic planning, design of settlements, development control, improved building controls, improved warning and response systems, community education, forestry management, rules for reconstruction and buyback schemes.
Appraisal and Challenges	DRR is still often understood by planning agencies as a specialist activity or interest group to be brought in periodically, rather than joined to underlying processes, due to multiple other interests. Uneven take up of integration across disaster types. Planning processes can overwhelm DRR with compromises to other unrelated matters, such as growth pressures, and the "force" of economic actors, or knowledge gaps when professionals take on multiple roles.

The highly procedural nature of urban planning (Hall and Tewdwr-Jones, 2011) is well suited to the cyclical and multi-disciplinary approaches being developed in DRR as a sequence of actions aimed towards achieving these outcomes. The synthesis of planning actions in "plans" is also well suited to many DRR approaches. Plans and the processes for their achievement will have a range of instruments, such as: action agendas; policies (decision rules for repeated actions); visions (images of the desired future); designs or masterplans; and, strategies or decision making systems processes to modify plans and overall directions over time (Hopkins, 2001). In this sense, planning, like DRR is an iterative, continuous and systematic process "where people make decisions about intended future outcomes, how outcomes are to be accomplished, and how success is to be measured and evaluated" (Emergency Management Australia., 2002: 20). Burby and Beatley et al. (1999) pinpoint the power of land use planning to deal with disasters, particularly in terms of the ways that social and organization aspects are typically drawn into planning approaches. This can reduce losses by (1) "affecting both the location and the design of urban development" and by (2) "helping create a knowledgeable constituency of citizens who support hazard mitigation programs".

To be successful, whether or not they are carried out in parallel, both urban planning and DRR must establish a set of clear purposes, including any benchmarks for success. Ideally these purposes should be ordered in terms of their importance, and assessed according to how reconcilable are with each other; they also can be divided into goals (i.e. general guidelines explaining what has to be achieved), objectives (i.e. programs, strategies or implementation steps toward the goals), and targets (i.e. specific actions to achieve the objectives) (Hall and Tewdwr-Jones, 2011, FEMA, 2003).

Usually urban planning approaches encompass multiple purposes, whilst DRR plans tend to focus in more specific situations (e.g. risk reduction from a specific type of hazard). A second step for urban planning and DRR is the plan design or planning strategy, i.e. adopting policies, programs and actions, and identifying relevant actors. While DRR's strategies are usually focused on a few priorities (e.g. increase of community safety and reduction of material losses to a specific type of hazard), urban planning approaches can often seek to address several different spheres (e.g. urban growth, land development, infrastructure, economic development, quality of life, aesthetics etc.).

Thirdly, urban planning and DRR approaches require implementation to be meaningful, supported by adequate policies and actions. In both cases, the establishment of monitoring mechanisms that periodically assess the performance of the on-going programs is key to success (FEMA, 2003, UNISDR, 2007) as well as involving citizens and stakeholders in evaluation procedures (Godschalk et al., 1998). In some senses assessment procedures could be easier to implement in DRR programs, where the objectives are usually more precisely defined but are perhaps less likely to be practically tested; whilst urban planning may encompass more abstract and multi-faceted purposes. The various modes of action these overall processes involve are discussed in the following sections.

Institutional Settings

While urban planning, particularly in developed countries, is usually integrated within governance structures, the status of DRR agencies and processes is highly varied across different nations and jurisdictions. Where planning systems of some sort are usually closely aligned with the provision of housing and a range of other urban services including transport, allocating resources to the treatment of emergencies may often be overshadowed by immediately pressing and more visible matters, unless a recent event has raised attention and concern. Even in developed countries, DRR may not be a national state or local priority and therefore may lack a strong institutional basis for implementation. As shown in summary in Table 2 below, due to the requirement for many fundamental modifications to structures, even when "common ground" can be found between agencies, successful integration of agencies is likely to be a long term prospect.

Table 2 - DRR & Urban Planning - Institutional Settings

1st Wave	Agencies have competing goals and success criteria, but find commonalities, particularly as they typically retain a focus on particular success criteria, often oriented to particular facets of the DRR or planning scale/process.
2nd Wave	The institutions of Urban Planning and DRR are re-formed and aligned to acknowledge inter-relationships but practitioners and agencies work across settings as functions and processes are increasing shared. The wider impacts of decisions and practices are increasingly understood to go beyond single agency or locales but to have wider links with sustainability or resilience overall. Vertical and horizontal agency integration occurs, including between physically oriented and response agencies, and human, economic and ecologically oriented institutions. Eg Insurance and response agencies are understood to play multiple roles and to have key impacts upon forward planning and recovery, and are linked between national local and individual scales.
Appraisal and Challenges	Ongoing structural impediments, often based upon existing governmental and business arrangements restrict re-alignment of roles, with multiple responsibilities making unclear roles and the implications of actions. Agencies may seek to avoid partial or overall responsibilities, or to acknowledge risks, which would in turn imply that action needs to be taken or that blame might be apportioned.

Of course disaster management policies, like planning can be traced back to ancient times (Coppola, 2011). Contemporary urban planning emerged as a response to the deplorable living conditions in the industrialized urban Britain during second half of the 19th century (Hall, 1996); "linked to a broader reform movement that sought to redress the ill of unconstrained capitalism through changes to the politics, economy, and geography of cities" (Yiftachel, 1998: 396). The integration over time of agencies has often occurred in parallel with disasters being understood in wider terms of risk reduction. Modern disaster management in developed countries originated during the mid-twentieth century, focusing on responding to nuclear attacks under a civil defense response and relief approach; these institutions gradually evolved towards responding to natural disasters (Coppola, 2011, Pearce, 2003). In the United States, for instance, the Federal Emergency Management Agency was established in 1979, whilst in Australia the Natural Disasters Organization (currently AEMI) was created in 1974 (Tarrant, 2006). The 1990s were declared by the UN as the "International Decade for Natural Disaster Reduction (IDNDR)". This effort concluded that it is usual for human and material losses provoked by disasters to be "due to a lack of coherent disaster reduction strategies by international and regional organizations, governments and decision-makers and the development of a culture of prevention among the public at large" (UNISDR, 2004: ix). This finding has been affirmed by more recent detailed studies in Australia (King et al, 2012).

The overall focus on risk reduction instead of disaster response has been adopted, at least as an ideal, by the main emergency management agencies around the world. A comprehensive paradigm - where communities are integrated and where risk reduction is now seen as a core part of good governance (Tarrant, 2006, Pearce, 2003). This has been associated with the United Nations' Hyogo Framework for Action 2005-2015 (UNISDR, 2007) establishing three strategic goals: (1) The integration of disaster risk reduction into sustainable development policies and planning; (2) The development and strengthening of institutions, mechanisms and capacities to build resilience to hazards; and (3) The systematic incorporation of risk reduction approaches into the implementation of emergency preparedness, response and recovery programmes. According to Coppola (2011) the Hyogo approach implies integration of a wide set of related stakeholders, in two main categories: (1) Governmental-related disaster management agencies (including fire departments, law enforcement, emergency management (civil protection), medical services, and the military), on the national, regional and local levels; and (2) Nongovernmental organizations, including the private sector and the academia. To these basic two groups, there should also be added governmental organizations directly related to the study and design of the natural and built environment, such as climate agencies and the land planning departments.

Knowledge, Intelligence and Decisions

A key element of both urban planning (Rydin, 2007) and of DRR (Smith, 2013) is the gathering, development and application of various types of data or intelligence and its analysis as a base for action. Indeed, much of modern urban planning's legitimacy is founded upon the development of knowledge sets that have their base in various knowledge systems. This seeks that improvement to spatial outcomes via planning actions are built upon a substratum of "intelligence" (Godschalk et al., 1998) or "planning background" (Emergency Management Australia., 2002) or "spatial modelling" (Fry & Williams, 2013) where the problems are defined and contexts are established. In the case of urban planning, this may include an information base containing the main existing socio-economic and geophysical characteristics, trends for future development, and the availability of human and material resources. DRR, in turn, must also encompass thorough risk identification actions, including hazard and vulnerability characteristics. Ideally, both realms would be supported by a strong community involvement. Planning processes can draw on multiple knowledge types, and can generate creative design solutions to complex problems, integrating these with decision making at a range of spatial scales and functionalities. DRR can draw on a range of knowledge types, from its traditional base in risk assessment, that aligns relatively well with urban planning processes, to more

immediate decision making related to response of recovery efforts that are more aligned to the "best" decisions being made in limited knowledge and time circumstances, which are now being augmented with new technologies such as real time mapping, decision making and communication tools. In addition, the development in the long term of experts, researchers and professionals that will generate, disseminate and match the development of new knowledge and approaches will assist in deepening the knowledge base. The challenge, as shown in Table 3 below, is to integrate these forms of intelligence into ongoing decision systems with competing success criteria.

Table 3 - DRR & Urban Planning - Knowledge, Intelligence and Decisions

1st Wave	Efforts are being made to share and integrate, making data sets complete and more readily available. Site assessments of projects and strategic directions.
2nd Wave	A wide range of data sets would be gathered and analysed across a range of users and agencies and made available so that decisions of many types could be used. Urban planning would be a central element of the gathering and use of this data so that scenarios could be assessed with the full understanding of likely risk implications with a spatial focus while integrating social, economic and environmental understandings at a range of scales.
Appraisal and Challenges	Understandings of the spatial and temporal diversity of vulnerability not being matched with risks assessment focused primarily upon single hazards. There are many challenges to making knowledge of various kinds accessible to the diverse groups of various users, and even if successful, this does not necessarily lead to changed behavior or better decisions. There is an ongoing need for improved education across levels and disciplines, and management of competing knowledge sets and success criteria.

Temporal Scales

As summarized in Table 4 below, while urban planning and DRR are both suited to looking to the future and can modify disaster risks, their respective orientations are often mismatched to the ideal for DRR in the built form. Because planners are often orientated to longer time frames, or development control in more immediate ways, planners often develop plans that do not take into account sudden onset events. This is due to a disciplinary predilection towards continual development of plans to the medium and long term. These plans typically seek to match or deal with development patterns or pressures in urban form, such as housing shortages. DRR efforts, in turn, usually focus on a specific disaster or crisis point, establishing actions of preparedness, response, and recovery. Mitigation efforts aim at eliminating those crisis points, or reducing their impact. The great potential of urban planning, when undertaken in a strategic manner, is that it can "steer" the overall direction or characteristics of settlements towards alternative futures at a broad level that harnesses a range of actors over time (Hopkins, 2001), and that can include DRR goals.

Table 4 - DRR & Urban Planning – Temporal Scales

1st Wave	Recognition of the need to work at and across various time phases, particularly emphasizing the benefits of mitigation in plan and prepare aspects for urban planning activities, rather than respond only.
2nd Wave	The various time scales necessary to DRR would be integrated across agencies and individuals to find the best risk reduction outcomes.
Appraisal and Challenges	The predominance of certain agencies means that their traditional time scale for operations and modeling has often been maintained at the expense of other more effective time scales. For example, planning agencies do not always take into account the response time scale and the needs of a range of actors during this period. Additionally, the current rate of technical change is often overwhelming, and older data may be lost in the processes of changing formats. As time passes, so to

	does the popular memory of disasters with long recurrence periods, and DRR may become focused on “low-impact” risks, which are most common.

To be effective, urban planning and DRR must be sustained activities, continually developed in parallel, in the mid to long term. In direct association, the two discipline areas seek to manage and often alter elements of the built and natural environment based upon temporal understandings of risk and the allocation of responsibilities and rights. Therefore, they share important similarities and also some differences. Myers and Kitsuse (2000: 221) argue that, “the very substance of urban planning is founded in time, because the process of urban development unfolds over decades”. This acknowledges the inherently long term view required when understanding risks in the built environment “[t]he actual construction of individual buildings and public works takes place over years and even decades or more (…) once built, these projects will live on for decades more into the future”. Shaping the future requires recognition of three components: the *past* (i.e. the elements that will be inherited from the past into forthcoming times –buildings, infrastructure, demographic patterns, etc.), the *present* (i.e. a transient phase to reconcile continuity and change), and *future* (i.e all the new elements that the plan hopes to create, plus new problems and opportunities). These components have a direct influence on establishing plans for short, medium, or long-range futures (Myers and Kitsuse, 2000), including the risks associated with particular land used and development patterns.

Importantly, the “present” phase in urban planning may in fact be a significantly long period, if one considers the time required for the design and endorsement of urban plans, a process that might take several years. Urban plans themselves, once accepted, may set deadlines for 10, 20 or more years. This contrasts in some ways with the often “sectoral” nature of DRR approaches, which are usually strongly conditioned, in a temporal way by the nature of the menace at hand. Plans to address discrete hazards with a long recurrence interval, such as tsunamis or earthquakes, may lay in abeyance for many years, until an event suddenly focuses governmental and public attention on them. This triggers a distinct shift to Response, a much shorter phase requiring intense activity and the ability to harness significant resources to resist the effects of a hazard.

Importantly, the pre-conditions of places have three main aspects that can influence risk by prior planning. The first is the avoidance or reduction of risks via land use planning and design, such as building away from flood plans or design and location of urban elements with increased resistance, or non-sensitive uses, in these locations, such as sports fields. The second is the establishment of conditions and arrangements in the urban form that provide for improved response by emergency agencies, often in association with community education or training. For example, these may for example be provision of access routes for emergency vehicles, or water points for fire services. The third is the establishment in advance of recovery plans or processes that allow opportunities for significant modification to urban patterns to be achieved in post disaster circumstances, even while political, economic or other conditions may be oriented to solutions that are less than ideal or based upon expediency. Post disaster circumstances provide windows of opportunity to reduce, maintain, or increase local vulnerabilities during reconstruction processes. Slow onset hazards (i.e. famines, droughts, etc.), in contrast, require sustained efforts over years to prevent reaching a crisis point, sometimes working away from public attention.

Spatial Scales

While urban planning encompasses a range of action modes and the development of knowledge or intelligence sets, its underlying attention to *spatial* relationships, between physical, social, economic and ecological systems provides a potentially powerful base for DRR. The spatial realm of planning is a continuum ranging from the site and neighborhood to inter-urban or regional scales. Distinctions

between local – urban - regional planning emerge according to the specific target or purposes of the plan, the dimensions addressed by it, and the involved governance structures and stakeholders. Hazards, as complex phenomena existing in natural and human made systems, are provoked and "delivered" by a myriad of environmental factors, occurring at different scales and via various modes within spatial territories. Accordingly, even disasters are inherently *spatial* in their characteristics, across the range of disaster types. DRR approaches are strongly determined by the scale of the hazards they address. Many of these phenomena (e.g. earthquakes, tsunamis, flooding) can simultaneously have impacts across regions and even across different continents, such as tsunamis. Other disaster types may be contained or have various scales according to the nature of the risk factors it is associated with, such as bushfires, or contagious disease outbreaks in densely populated areas. As shown in Table 5 below, even while this is recognized at a conceptual level, to act upon this sentiment requires that integrated capabilities are developed that bridge these scales, often in contrast to traditional structures.

Table 5 - DRR & Urban Planning – Spatial Scales

1st Wave	Acknowledgement of the range of scales at which different hazards and risks exist, and the need for agencies to span these.
2nd Wave	An integrated set of capabilities across scales that can adapt to the range of spatial scales appropriate to different disaster characteristics, drawing together a range of actors to work through various modes of planning and the DRR cycle and time scales.
Appraisal and Challenges	Actions are often constrained by jurisdictional boundaries and a mismatch of spatial responsibilities and capabilities by agency and DRR tool. For example, flooding tools in planning have typically been based on 1:100 year flood risk mapping, ignoring the complexities of risks on a sliding scale and the need to integrate activities at a range of spatial scales to modify flood behavior. The need remains for better ways to integrate high-level technical knowledge to small and large jurisdictional governance systems (with variable monetary and technical resources).

Just as disaster phenomena themselves occur at various scales, DRR actions can occur at a range of spatial scales. DRR initiatives can be established from the higher levels of government (e.g. U.S. congress' Disaster Mitigation Act from the year 2000); however they usually require successive lower tier governments down to the municipal or local scale to prepare and implement mitigation plans on, even while inter-local coordination structures are often defined.

Importantly, emergency response approaches have traditionally been based on military-style chains of command or pyramidal structures. These are often well suited to the Response stages of an emergency, *if* the emergency or disaster occurs at a scale suited to the prior structure established. However, the variable spatial scale of many disasters requires responsibilities being allocated in multiple ways and the ability to marshal resources quickly while taking a strategic view of decision making. For example, after the 2010 Chilean earthquake, the centralized National Emergency Management Agency - based in the capital city Santiago - did not release an official tsunami warning (because of a lack of technical information). This implied that no evacuation procedures were implemented, and hundreds died in tsunamis in small coastal towns, located hundreds of kilometers from the city.

Further, rigid organization structures that are not suited to the scale of disasters are often unable to provide the wider view required for DRR, that typically requires significant amounts of cross-sectoral, multi-scale and multi-actor approaches. Planning systems may provide means for connection between actors and systems at various spatial scales, particularly in terms of its ability to provide coordinating mechanisms during plan-making processes and regulation of change. Urban planning

offers a range of spatial mechanisms that can be harnessed to shape or control physical outcomes. For example, zoning, the broad process of establishing and implementing regulatory controls over development and land use on the basis of spatially specific decision rules is a potentially powerful mechanism. Similarly, complementary controls that integrate other related approaches over building standards, vegetation controls, or transport systems have many potential benefits that also offer possibilities for integration and coordination, as taken up in the next section.

Coordination and Social Integration

Geis (2000) argues for the Disaster Resistant Community (DRC) concept, defined as "the safest possible community that we have the knowledge to design and build in a natural hazard context". He suggests that the DRC approach must address physical aspects through building codes and land use plans, but also the other social dimensions related to development. Starting with top-down and expert driven approaches, urban planning has evolved to increasingly incorporate public participation, especially since the 1970s (Hall and Tewdwr-Jones, 2011). Communicative or collaborative planning emerged in the late 1980s and 1990s, characterized by attempts to satisfy many competing claims when "confronted with social diversity", and undertaking planning's task of taking collective action (March, 2012: 26). Due to the need to draw many parties together, urban planning has developed a range of mechanisms that range between the use of decisive expert or elected representative driven approaches, multi-agency referral processes, allocation of tasks to various governmental tiers, integration of variations to democratic and corporate decision processes, and the use of participation techniques. Urban planning has considerable experience with the possibilities of participation, where DRR agencies are generally new to the challenges of "useful" participation. This highlights the many challenges that exist in the implementation of newer network governance, or joined-up governance models, particularly as older representative approaches are less effective (Nyseth, 2008). However, urban planning systems are potentially able, by "specifying a set of actions that engage participating organizations in the regular review of risk factors in their interdependent environments", to foster "processes of continuing learning and reverse the destructive spiral that has led to an increasingly fragile and threatened environment" (Comfort et al., 1999: 42)

A number of challenges remain if coordination and integration is to occur, as shown in Table 6 below. An organizing principle to act on this is offered by Godschalk, Kaiser et al. (1998) who argue that the planning process for disaster mitigation serves seven purposes: (1) it gives the community the opportunity to consider its issues systematically and comprehensively; (2) it provides the rational nexus between public interests and proposed policies; (3) it educates the community about hazards and what can be done to deal with them; (4) it allows participants to reach consensus on goals, actions, priorities and methods, and to build commitment; (5) it coordinates the multiple issues, goals, and policies of a community, across different dimensions; (6) it documents all this information, and communicates it to citizens and interested stakeholders; and (7) the plan is a means of implementing policy, a guide toward coordinating the community's actions.

Table 6 - DRR & Urban Planning – Coordination and Social Integration

1st Wave	Acknowledgment of the value of coordination and public participation as an element of DRR, ensuring broad understanding and the possibilities to learn from the community.
2nd Wave	Tasks across the spectrum of action are allocated and coordinated so that involvement occurs in such a way that is efficient and organized towards risk reduction. The knowledge of a range of parties is integrated without privileging some, or providing opportunities that do not yield beneficial outcomes. Involvement in processes provides opportunities that are beneficial for participants, as well as

	DRR agencies, and provide legitimacy for decisions that may not be popular but are necessary. Justification and reasons for all decisions are available and can be contested if appropriate.
Appraisal and Challenges	Increasing complexity has led to excessive and negative participation in some cases. Certain aspects of systems, such as political expedience, can over-ride processes so that good decision making is eroded, particularly as older representative democracy models may become less effective.

Conclusions

This paper was initiated from a desire following Beck (2008) to set out ways to reduce impacts upon people and places, by more fully connecting risk processes into the "normal" activities of modern systems, including urban planning. The paper has set out a framework of categories that provide ways to understand the possibilities for convergence between urban planning and DRR approaches. It is argued that this can provide pathways to improved resilience, as a process developed simultaneously across multiple dimensions (Resilience Alliance, 2007).

Six categories were established (1) modes of action and processes; (2) institutional settings (3) Knowledge, Intelligence and Decisions; (4) temporal scales; (5) spatial scales; (6) coordination and social integration. We have argued that partial transformations in the approaches used can be discerned in the links between urban planning and DRR, where understandings of risk are increasingly being integrated within the wider processes of urban planning. The paper shows that in each realm of action, while some advances have been made, the use of this framework shows many areas where further research and practical action could improve resilience to disasters via urban planning. Further investigation of these categories, using the 2nd Wave features as a guide for investigation in Australian and international cases can provide pathways to improved disaster resilience.

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