PLANNING FOR NATURAL HAZARD RESILIENCE: AN ASSESSMENT OF CONTEMPORARY AUSTRALIAN DISASTER MANAGEMENT POLICY AND STRATEGY

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ABSTRACT: As climatic trends point to an increase in the severity of natural hazard conditions, the risk to Australian settlements is only increasing. Although these events are unavoidable, resilience management seeks to foster greater adaptive capacity through new-age policies and strategies. This paper provides an assessment of contemporary Australian disaster management policies and aims to determine how strategic plans incorporate and foster resilience through planning interventions. A key aim is to comparatively assess, through the application of a discursive methodology of analysis, the differences that lie between these plans to gauge the current state of resilience management in an Australian context.

KEY WORDS: natural hazards, policy analysis; comparative analysis; resilience, climate change.

1. INTRODUCTION

Dynes and Drabek (1994, p. 18) stated that "disasters as an object of study will not quickly nor easily disappear as a topic of concern", and the volume of research and academic discourse in the last decade in the field of natural hazard management and mitigation demonstrates that this is an area of increasing interest (Buxton *et al*., 2011; Crosweller, 2015). In particular, the tangible amplification of bushfire disaster risk to Australian communities highlights that "change to improve the process is urgent … [and] most Australians would like to believe that fire protection and community safety are beyond politics" (Hughes and Mercer, 2009, p. 139). Gonzalez-Mathiesen and March (2014, p. 36) contended that "further

important work is also required at the strategic level" for better and more efficacious natural hazard risk reduction and management strategies in urban planning. Within this space, Coaffee and Clarke (2016) cited the managerial paradigm shift from risk management to resilient management. Further, scholars are pointing to signals of change, including the 'hazard strategy' delivered by the Australian Government (Measham *et al*., 2011). Coaffee and Clarke (2016) identified that "Australia has an 'all hazards strategy' that provides a foundation for collaboration and organisational resilience building rather than a probabilistic risk management framework. It is argued that this better enables owners and operators to prepare for and respond to a range of unpredictable or unforeseen disruptive events" (pp. 8-9).

   Given that contemporary society is now, in a practical sense, "shaken by the anticipation of global catastrophes", the response is "the institutionalization of new mechanisms … [that] are intended to prevent and mitigate risks, prepare and respond to emergency situations, and provide for recovery" (di Floristella, 2016, p. 285). In other words, the new paradigm of catastrophic risk has stimulated work by academics and policymakers in the associated fields of resilience and crisis management (Buxton *et al*., 2011; Ibarraran *et al*., 2009; Yates and Bergin, 2009). Corry (2012) suggested that this evolving notion of risk has resulted in new precautionary mechanisms and the recalibration of policies, strategies and governance. In the face of amplified risks, policymakers and strategists are beginning to respond by "adopting adaptable and reflexive approaches to [disaster risk management] DRM … appropriate under the changing circumstances described here" (Scolobig *et al*., 2015, p. 3). This emerging approach goes beyond risk management to resilience management to address the complexities of large integrated systems and the uncertainty of future threats. As Linkov *et al*. (2014, p. 407) noted, "risk management helps the system prepare and plan for adverse events, whereas resilience management goes further by integrating the temporal capacity of a system to absorb and recover from adverse events, and then adapt". In the debate on resilience management, Coaffee and Clarke (2016) recently articulated that "as a new and extended form of risk management to cope with the complexities of large integrated systems, reflecting an overall consensus about the necessity of adaptation to the uncertainty of future threats … there is a noticeable implementation gap in how such ideas are operationalised in practice" (p. 7).

   This paper provides an assessment of contemporary Australian disaster management policies and planning strategies. Its purpose is to determine

how strategic plans incorporate and foster resilience in effective disaster management through mitigation, prevention and response planning. This research builds upon Coaffee and Clarke's (2016) identification that Australian disaster management strategies provide a foundation for collaboration and organisational resilience building, rather than a probabilistic risk management framework. It investigates how resilience ideas are shaping the ways in which hazard strategies in Australia incorporate complex risk, and the tensions elicited in the transition from protective approaches to approaches founded on the basis of greater resilience. This paper centres on and tests the concept of resilience management theory embedded as strategic intent within municipal policy and strategy. It builds upon the earlier work of Jabareen (2013) and proposes a matrix to review and analyse the hazard strategies of three municipal Australian state disaster management plans in South Australia, Tasmania and Victoria. A key aim is to comparatively assess, through the application of a discursive methodology of analysis, the differences that lie between these plans to gauge the current state of resilience management in an Australian context. The results are important for informing disaster management policy that adopts and actively fosters greater resilience, now and into the future.

2. RESILIENCE MANAGEMENT AND DISASTER RISK REDUCTION

Although resilience policy making is steadily gaining presence, resilience is still very much a contested term. Opinion is varied among critical social science scholars regarding the effectiveness of the implementation of the principles of resilient management, and particularly social-ecology resilience (SES) thinking, for producing progressive possibilities for planning theory and practice (Biermann *et al.*, 2016; Coaffee and Lee, 2016; Davoudi *et al.*, 2012; Tierney, 2015; Vale, 2014; Walker and Salt, 2012; White and O'Hare, 2014).

Resilience thinking has quickly emerged as a significant theme within "the international politics research community, especially among those scholars concerned with issues of how states and global governance handle various forms of risk and uncertainty" (Duit, 2016, p. 336). Therefore, with the proliferation of resilience thinking within several disciplines and public policy discourses, "its apparent 'normalcy' need(s) to be contested and questioned" (Dunn Cavelty *et al.*, 2015, p. 6). This is to say that the SES resilience paradigm has not gone unnoticed and critical voices have started to emerge, highlighting its problems. Therefore, the following questions

need to be asked: Resilience for whom, and by whom? And how can resilience be implemented into public policy in a non-trivial manor? (Coaffee and Lee, 2016; Duit, 2016). Furthermore, scholars have argued that resilience has been utilised to rescale and localise responsibility to individual actors in local scales of operation (Coaffee and Lee, 2016). In his strong critique, Neocleous states that the process of redistributing crisis and disaster management responsibility and governance to the local level has been branded as 'neoliberal citizenship' (2013, p. 5). Tierney (2015, p. 1333) concurs, stating that "in a global context of continual risk and uncertainty, individuals are challenged to achieve resilience by becoming adaptive and seeking out opportunities for betterment in an entrepreneurial fashion" and therefore, "resilience could be viewed in terms of the underlying power structures it supports, which may or may not be desirable" (Wenger, 2017, p. 8).

Policies to increase resilience often focus on short-term actions and recovery in preference to addressing underlying causes which is a more desirable approach from an ecological or long-term viewpoint (Sudmeier-Rieux, 2014; Wenger, 2017). For example, "social landscapes can result in disadvantaged groups being assessed to hazardous (but affordable) locations in low quality housing that will perpetuate long-term risks" (Wenger, 2017, p. 18). "In other words, the emergence of resilience has disrupted the traditional relationship between the state and the individual" (Coaffee and Lee, 2016, p. 39). As Rose notes, this places the onus on individuals and local communities to "regulate individual conduct" (Rose, 2000, p. 324). This phenomenon is impart explained by the dynamics of the policy making process, which is "considerably more messy and ugly than SES (social ecological system) resilience thinking recognizes" (Duit, 2016, p. 373). The policy making process itself is plagued with internal dynamics and bureaucracy and, therefore, cannot be a reliable source of optimal solutions to societal problems (Duit, 2016; John, 2011). For example, resilience scholars have identified key system properties, such as leadership and trust, to maximise general resilience in a socio-ecological system (Carpenter *et al.*, 2012). However, controlling these system properties has proven to be exceedingly difficult in practice and often "lies beyond the capacity of most real-world managers (even more so in countries with weak institutions)" (Duit, 2016, p. 373). Similarly, Wenger (2017) argues that resilience, utilised as a politicised buzz-word, can justify any activity, "which limits its usefulness as a guiding concept" (p.18), and thus, "frameworks need to be critically assessed and revised and measures

reviewed to determine how they can contribute to long-term desirable outcomes" (p. 21).

Given current and evolving environmental realities, "we have recently witnessed how natural disasters have cost lives and destroyed urban spaces and communities" (Jabareen 2013, p. 220). Accordingly, the volume of research and academic discourse conducted in the last decade in the field of natural hazard management and mitigation demonstrates that this is an area of increasing interest (Buxton *et al*. 2011). For example, given the tangible amplifications of bushfire disaster risk to Australian communities, the need for "change to improve the process is urgent, …most Australians would like to believe that fire protection and community safety are beyond politics" (Hughes and Mercer 2009, p. 139). Lagadec (2009, p. 484) argues that a management-paradigm shift in the way we approach complex crises is required, expressing "it is urgent to consider the very risks of our risk analysis and crisis management culture, which are currently tending to become veritable bridgeheads of the emerging crises themselves". More specifically, March (2016, p. 171) affirms that more work must be done in respect to urban planning approaches to disaster risks in Australia by stating "further interrogation of activities across and between (Australian) states is required".

This paper draws upon Parsons *et al*.'s (2016) Australian Natural Disaster Resilience Index (ANDRI) to examine how the resilience construct is reflected within disaster management policy. Parsons *et al*. note the requirement of government agencies to learn, adapt and transform, which is to say remain 'flexible', if they are to foster resilience. The authors affirm that "collaborative learning facilitates innovation and opportunity for feedback and iterative management" (Parsons *et al*., 2016, pp. 7). Jabareen (2013) concurs that a resilient city is one that frames governance within community collaborative decision-making processes, open dialogue, accountability and grassroots participation. This approach to governance fosters transformative qualities, whereby it allows the community to collectively frame experiences and assess and engage in critical analysis (O'Neill and Handmer, 2012; Pfefferbaum, *et al*., 2013; Smith *et al*., 2016). As previously touched upon, governance must also transcend traditional approaches and prepare for uncertainties to remain flexible in a rapidly changing environment (Jabareen, 2013; Mirfenderesk and Corkill, 2009; Smith *et al*., 2016). Thus, the intention of adaptive and transformational governance is not to dictate a singular path for change, "but rather to open up possibilities to enable more sustainable futures to emerge" (O'Neill and Handmer, 2012, pp. 5–6). Within the framework, Parsons *et al*. (2016, p. 7) utilise various "themes of coping and adaptive

capacity within the Australian Natural Resilience Index". In particular four themes are utilised in the construction of this conceptual framework: "infrastructure and planning", "information and engagement", "governance policy and leadership" and "prevention"—a theme adapted from Jabareen's (2013, p. 224) Resilient City Planning Framework. Jabareen (2013, p. 224) articulated the importance and relevance of prevention to "assess urban mitigation policies to reduce hazards, [and] involve the spatial restructuring of the city in order to prepare it for a future environmental disaster".

Key Features to Inform: Infrastructure and Planning

The key attributes that have been identified to inform infrastructure and planning include built infrastructure, urban planning for hazard risk and uncertainty-oriented and adaptive planning. Planning practice is an instrument to facilitate disaster resilience change by shaping the built environment and influencing socio-spatial and environmental policy (Jabareen, 2013; Parsons *et al*., 2016; Smith, 2009). Consequently, as a means to protect vital infrastructure systems, planning is considered an important tool for natural hazard risk management (Parsons *et al*., 2016). Specifically, Meerow *et al*., (2016, p. 45) define urban infrastructure as "the built environment such as buildings, transportation networks, energy, and water grids (utilities), along with urban green space and parks". Uncertainty oriented planning and adaptive capacities represent strategies and projects that seek to adapt to climate change and shift natural disaster paradigms for the purposes of vital infrastructure protection. Thus, provisioning for risk uncertainty is a key component to fostering disaster resilience (Parsons *et al*., 2016; Smith *et al*., 2016; United Nations University, 2014).

Key Features to Inform: Urban Governance, Policy and Leadership

The transformational capabilities of governance, organisational flexibility and collaborative governance approaches are the key attributes to inform urban governance, policy and leadership. Meerow *et al*. (2016, p. 45) conceptualise urban governance networks as "the diverse range of actors and institutions whose decisions shape urban systems. This includes the levels of government (denoted by 'states'), nongovernmental organizations (NGOs), and businesses". These actors must adapt to changing natural disaster paradigms (Jabareen, 2013; Parsons *et al*., 2016).

Therefore, transformative adaptation requires a fundamental change in bureaucratic or regulatory regimes associated with disaster management approaches, whereby governance can use past events and future outlooks to adapt and transform (Jabareen, 2013; O'Neill and Handmer, 2012; Parsons *et al*., 2016; Scolobig *et al*., 2015). Pfefferbaum *et al*. (2013, p. 252) stated that transformative capability "includes the ability of communities to identify and frame collective experiences, examine their successes and failures, assess their performance, and engage in critical analysis". This allows for communities to build skills, assist in strategy development and collectively act to mitigate disaster risk. Collaborative governance allows for learning and unified action, which, in turn, facilitates innovation and allows for feedback and iterative management (Berkes, 2007; Parsons *et al*., 2016). Moreover, collaboration between stakeholder groups and the integration of institutions and agencies fosters greater equity and efficiency, ultimately cultivating greater resilience through unified approaches to risk and disaster situations (Jabareen, 2013). Ernstson *et al*. (2010) add, "to sustain a certain dynamic regime, urban governance also needs to build transformative capacity to face uncertainty and change" (p. 533).

Key Features to Inform: Information and Engagement

  Social and community engagement and self-organisation are crucial traits to inform information and engagement within the resilience-management and natural-hazards framework. Social and community engagement "represents the social enablers within communities for engagement, learning, adaptation and transformation" (Parsons *et al*., 2016, p. 7). Built through social mechanisms such as education programs and training, cooperation and trust are essential to fostering disaster resilience in communities (Berkes *et al*., 2002; Handmer and Dovers, 2013; Parsons *et al*., 2016; Portugali, 2008; UNISDR, 2012; United Nations University, 2014; Wilkinson, 2012). Moreover, stakeholders and organisational departments should have a clear understanding of their role in disaster preparedness and risk reduction (UNISDR, 2012; United Nations University, 2014). As described by Wilkinson (2012, p. 159), the self-organisation of social actors within a city consists of "complex adaptive systems and that urban systems are in fact dual self-organizing systems where the parts (or agents) themselves are also complex adaptive systems". Given their "cognitive capabilities such as learning, thinking, decision making and the like" (Portugali, 2008, p. 257), the abilities of social actors to prepare, organise and self-rely promotes resilience (Parsons *et al*., 2016;

Wilkinson, 2012). As noted, active engagement allows the community to collectively frame experiences and assess and engage in critical analysis (O'Neill and Handmer, 2012; Pfefferbaum *et al.*, 2013; Smith *et al.*, 2016).

Key Features to Inform: Hazard Prevention and Mitigation

Key attributes to inform hazard prevention and mitigation incorporate conceded disaster-prevention protocols and active ecosystem management. Broadly speaking, this concept of prevention suggests that to build resilience and lessen vulnerability, urban environments must aim to prevent environmental hazards through specific measures (Jabareen, 2013). Preparedness seeks to lessen the effects of natural disasters by identifying threats, assessing susceptibilities and formulating plans to mobilise resources for specific threat prevention (Pfefferbaum *et al.*, 2013). Next, mitigation strategies, procedures and protocols represent preparation for specific natural disaster events and, in practice, actively reduce the effects of disaster hazards on urban settlements (Crompton *et al.*, 2010; Jabareen, 2013; Parsons *et al.*, 2016). Adaptive strategies for climate change seek higher ecosystem resistance. In the context of natural disaster risk, potential points of risk need to be identified and dealt with through active ecosystem management, natural resource management and ecosystem modification (Fernandes, 2012). Ecosystem management and allocation is also integral to natural disaster resilience. In particular, resilient communities should make a conceded effort to identify the risks at hand, and "acquire, invest in, allocate, and use resources effectively to serve members and the community at large" (Pfefferbaum *et al.*, 2013, p. 252). For example, Wegner (2017, p. 11) offers the ecological example of flooding, whereby an "artificially stable, dry system could enable inappropriate development to build up in a hazardous area". Similarly, Gunderson (2010) speaks to fuel build up in a forest where fires are stifled.

To highlight the components of resilience management associated with natural hazards, the four key themes and their attributes have been summarised in a matrix format (see Table 1). The matrix is utilised to articulate the most contemporary, contextually relevant themes and attributes of the resilience construct from the resilience literature. Only by understanding the relationship between different components and how they interact to enable or constrain resilience can a clearer picture of overall resilience be drawn (Norris *et al.*, 2008; Faulkner *et al.*, 2018).

Table 1. Understanding Resilience Management and Disaster Resilience.

Key Theme	Attributes	Key Questions (Measurements)
Infrastructure and planning	• Spatial planning for hazard risk (Jabareen, 2013; Parsons *et al*., 2016; Smith, 2009) • Built infrastructure (Jabareen, 2013; Parsons *et al*., 2016; United Nations University, 2014) • Uncertainty-oriented planning and hazard-adaptive planning (for climate change) (Council of Australian Governments, 2011; Jabareen, 2013; Parsons *et al*., 2016; Pitman *et al*., 2007; United Nations University, 2014; Wardekker *et al*., 2010)	• What adaptation measures are being taken to reduce risks by addressing hazard uncertainties and climate change issues (Jabareen, 2013)? • Has the importance of vital, built infrastructure been addressed (Jabareen, 2013; Parsons *et al*., 2016)?
Urban governance, policy and leadership	• Transformational and flexible capabilities of governance (Jabareen, 2013; Parsons *et al*., 2016; Pfefferbaum *et al*., 2013; O'Neill and Handmer, 2012; Scolobig *et al*., 2015) • Collaborative governance approaches (Berkes, 2007; Parsons *et al*., 2016)	• Has collaborative decision-making and planning regarding natural hazards and environmental uncertainty been undertaken (Jabareen, 2013)? • Is civic public leadership exhibited (Parsons *et al*., 2016)? • Is there evidence of transformative adaptation and willingness to alter value systems, frameworks and constructs (Parsons *et al*., 2016)?
Information and engagement	• Social and community engagement (Berkes *et al*., 2002; Handmer and Dovers, 2013; Parsons *et al*., 2016; UNISDR, 2012; United Nations University, 2014; Wilkinson, 2012) • Self-organisation (Parsons *et al*., 2016; Portugali, 2008; United Nations University, 2014; Wilkinson, 2012)	• Is there evidence of active engagement and stakeholder learning to foster equity and further transformational properties within the community (Parsons *et al*., 2016)? • Is there active information dissemination (UNISDR, 2012; United Nations University, 2014)?
Hazard prevention and mitigation	• Hazard prevention and mitigation measures (Crompton *et al*., 2010; Fernandes, 2012; Jabareen, 2013; Pfefferbaum *et al*., 2013; Parsons *et al*., 2016; UNISDR, 2012; United Nations University, 2014) • Ecosystem management to mitigate natural hazard risk (Pfefferbaum *et al*., 2013)	• What measures are being taken to prevent and mitigate hazards (Jabareen, 2013; Parsons *et al*., 2016)?

Source: the Authors.

3. EVALUATION OF THE OBJECTIVES OF AUSTRALIAN STATE DISASTER MANAGEMENT PLANS AGAINST KEY THEMES AND THEIR ATTRIBUTES OF RESILIENCE

Three Australian states—South Australia, Tasmania and Victoria—were chosen for this critical review, as their geographical and environmental similarities lend them to a comparative analysis within an Australian context (Kiem *et al*., 2016). All three Australian state disaster management plans were published in either 2015 or 2016 and were chosen for their contemporary nature. The State Emergency Management Framework (2016) of Western Australia and the Queensland State Disaster Management Plan (2015), are also contemporaneous yet were omitted from this study due to scope and capacity constraints.

State Emergency Management Plan for South Australia

Infrastructure and planning theme:

In the State Emergency Management Plan (SEMP) for South Australia, infrastructure was initially addressed in the 'preparedness' section of the plan and was addressed as a matter of critical importance in times of disaster (Government of South Australia, 2015). The SEMP addressed, in significantly less frequency and weight, the practice and use of urban land-use planning and its ability to spatially influence natural and built environments to foster resilience. The plan aimed to address infrastructure and the built environment and considered the effect that an event may have on essential physical infrastructure—those human-made assets that underpin the functioning of a community. The plan emphasised critical infrastructure and its importance to the community in times of disaster yet failed to significantly address land-use planning as a useful, preventative tool.

The SEMP sparsely articulated provisions that employ spatial planning for natural hazard mitigation. Notwithstanding, from a broader policy perspective, the plan stipulated that the state's land-use planning approach "may include, but not be limited to areas such as risk assessments for the State relative to a particular hazard" (Government of South Australia, 2015, p. 21). Finer, more specific articulations on the need for uncertainty-oriented planning, strategic foresight and hazard adaptation were in relation to infrastructure and were expressed only once within the plan. Here, the SEMP stated that post-hazard or disaster events provide the

opportunity to plan ahead and "implement sustainable improvements for the future" (Government of South Australia, 2015, p. 43).

The importance of infrastructure was mentioned with some frequency throughout the plan. For example, in the 'recovery' section of the plan it was acknowledged that recovery is more than just replacement of what was there, but "a complex social process that provides an opportunity to improve and enhance conditions in an affected community" (Government of South Australia, 2015, p. 41).

Urban governance, policy and leadership theme:

There is limited reference in the SEMP that pertains to the transformational and flexible capabilities of governance to adjust to changing hazard paradigms and climate change. However, collaborative governance approaches to natural hazard risk have been addressed.

In 'prevention', the first objective of the plan, governance was addressed by outlining the state's approach to hazard mitigation, response and recovery coordination, and specifying how certain agencies and groups must function together to tackle risk and hazards (Government of South Australia, 2015). Principally, the plan asserted that various groups are "required to have a plan that will allow for a coordinated approach to any incident or disaster" (Government of South Australia, 2015, p. 26). These "agencies are to work together … in a joined up [sic] approach" and, of these groups, the 'control agency' is required to "develop and share plans and strategies that meet the requirements of all agencies responding to the emergency" (Government of South Australia, 2015, p. 28).

Information and engagement theme:

The plan addressed information and education through objectives for hazard event 'response' by facilitating learning pertaining to hazard events. It articulated that "within 3 weeks of the completion of the response to an event, a formal debrief will be convened by the Control Agency in order to ensure that any lessons learnt are captured" (Government of South Australia, 2015, p. 35).

Initially, the plan highlighted community engagement by stating that "coordination and communication both at and between the various levels of operation assist in ensuring the success of recovery activities for the affected community" (Government of South Australia, 2015, p. 41). Accordingly, the plan spoke to the social environment, the changing needs of the community and the engagement measures to bring about these

changes. To this effect, the plan stated that "post event, there may be windows of opportunity for significant community development projects to be launched" (Government of South Australia, 2015, p. 43). Overall, community development was significantly featured within the SEMP.

Hazard prevention and mitigation theme:

To mitigate natural hazard risk, the plan did not specifically prescribe policies that address or encourage active ecosystem management. However, the plan did address hazard prevention through a separate objective explicitly devoted to prevention (Government of South Australia, 2015). In this section, the SEMP detailed governance structures for hazard prevention such as the "State Mitigation Advisory Group (SMAG)— responsible for prevention and preparedness" (Government of South Australia, 2015, p. 21). Yet, no discerning policy provisions were detailed for natural hazard prevention.

Tasmanian Emergency Management Plan for Tasmania

Infrastructure and planning theme:

Within the Tasmanian Emergency Management Plan (TEMP) for Tasmania (Tasmanian Government, 2015), the role and practice of urban planning is referenced as well as the need for further research into risk uncertainties and climate change. All four sections of the plan emphasised critical infrastructure and its importance to the community in times of disaster.

Regarding urban planning, the TEMP articulated provisions and policy positions that recognise the importance of urban planning in hazard risk reduction. In Section 3.1, 'prevention and mitigation', the plan stated that "current themes in risk treatment focus include, but are not limited to … land-use planning reforms" (Tasmanian Government, 2015, p. 54). The plan expanded this policy prescription in Section 3.1.21, expressing that "Tasmania's strategic and statutory land-use planning instruments, along with building control, include a range of effective prevention and mitigation strategies that can be used by State and local planning authorities to reduce communities' exposure to emergencies resulting from natural hazards. The intent of this approach is to deliver long-term community safety outcomes and, by either requiring a greater consideration of the hazard for new development or strategically changing

settlements patterns, to minimise the risks (financial, infrastructure, cultural) to the community" (Tasmanian Government, 2015, p. 54). This policy forms a key process for prevention and mitigation in Tasmanian emergency management.

In the context of uncertainty-oriented planning and adaptive policy measures, current research and risk assessment themes under consideration in Tasmania include "climate change impacts on frequencies and intensity of flooding, storm surge and coastal erosion and wildfire" (Tasmanian Government, 2015, p. 53). The plan specifically addressed the influence of climate change on natural hazards and the provisions for these changes with conceded initiatives. The TEMP articulated that, while climate change is not in itself a hazard, it is predicted to cause an increase in the sea level and to the frequency and intensity of natural hazard events (Tasmanian Government, 2015).

Urban governance, policy and leadership theme:

In the plan, there was reference to the transformational and flexible capabilities of governance. There was also evidence in the TEMP of collaborative governance approaches to natural hazard risk. The TEMP (Tasmanian Government, 2015, p. 76) outlined policy that specifically seeks collaboration among a number of stakeholders to improve and strengthen emergency management capabilities and stated that "stakeholders/emergency management partners can include, but are not limited to Organisational leaders/managers; Supporting agencies and service providers; Regulators (where appropriate): and Workers and stakeholders"

The plan also incorporated various policy prescriptions that incorporate flexibility so that governance can use past events and future outlooks to adapt and transform. Specifically, flexible and adaptive management approaches were detailed, with emergency management strategies, protocols and similar instruments being subject to a validating process. The policy stated that "validation activities include debriefs, exercises and workshops/meetings where arrangements for emergency management are examined to assess the likelihood of the effectiveness of arrangements in emergencies" (Tasmanian Government, 2015, p. 61). Additionally, the policy framework sought to address gaps in current strategies by 'identifying lessons'. To remain flexible and adaptive, systematic reviews of the outcomes of operations and exercises should be reported through the consultation framework to address gaps and strengthen emergency management (Tasmanian Government, 2015).

Information and engagement theme:

The aspect of social and community engagement appeared in the TEMP through seeking to inform the community and engage them in the development of hazard management strategies. These principles and polices were initially articulated in the 'prevention and mitigation' segment of the plan. The plan stated that an important part of the TEMP strategy involves "developing skill and knowledge sets, and tangible resources related to … risk management, project management and business system integration, community education and awareness programs (e.g. [sic] psychological first aid)" (Tasmanian Government, 2015, p. 54).

The plan employed various policies to engage the wider community in recovery efforts for more resilient outcomes. The current TEMP agreements stated that "recovery is an integral part of emergency management. It occurs through effective communications with emergency affected communities and can provide an opportunity to improve these aspects beyond previous conditions, contributing to a more resilient community (i.e. restoration of facilities and services may not be the most valuable course of action)" (Tasmanian Government, 2015, p. 82).

The "priority focus is to identify appropriate processes and structures to fully engage the community during the recovery process" by "assisting the community to manage its own recovery, rebuilding emotional, social and physical well-being through a coordinated and planned process that can also include other recovery partners" (Tasmanian Government, 2015, p. 85).

Hazard prevention and mitigation theme:

The TEMP articulated various policy prescriptions to address or encourage active ecosystem management to mitigate natural hazard risk. The TEMP stated that "physical prevention works and activities" are listed within the plan as one of the "current themes in risk treatment", and "a significant investment is currently directed towards a range of physical preventative works and activities, including flood modification structures and levees, and strategic wildfire fuel reduction" (Tasmanian Government, 2015, p. 54). Finally, the plan articulated that, where possible, post-disaster recovery planning should contribute to future mitigation requirements or improvements (Tasmanian Government, 2015).

Emergency Management Manual Victoria for Victoria

Infrastructure and planning theme:

The 2016 Emergency Management Manual Victoria (EMMV) detailed policy that identifies the importance of critical infrastructure to the community, the value of urban planning in risk mitigation and prevention and the required planning for future hazard risk (Emergency Management Victoria, 2016). Part 2 of the EMMV, titled 'Emergency Risk Management and Mitigation in Victoria', exemplified the ethos of a new natural hazard paradigm in the context of uncertainty-oriented planning and policy measures. The policy outlined frameworks for hazard preparedness and mitigation, with the intent to address future hazard risks and limit their effects through present-day planning. Specifically, the EMMV stated that "effective mitigation builds on a risk assessment that is customised to the hazards, the vulnerabilities and the resilience of the relevant community or area" (Emergency Management Victoria, 2016, pp. 2-4). In turn, the benefits of affirmative action in the face of changing environments include "reduction of loss of life and damage to property, an important consideration given that the costs of emergencies are increasing due to factors such as the level of personal property of people in the affected area, density of population, aging [sic] infrastructure or climate change" (Emergency Management Victoria, 2016, pp. 2-6).

Finally, in Part 4, Section 7 of the manual, Emergency Management Victoria stated that recovery assistance "is based on continuing assessment of impacts and needs" (2016, p. 25). While only briefly outlined as a principle, the plan acknowledged that during times of recovery, there is an opportunity to further build capacity and foster greater future resilience (Emergency Management Victoria, 2016). This section of the manual specifically addressed the importance of built infrastructure to the community, and thus, provided various policy directions and provisions for the re-establishment of critical infrastructure (Emergency Management Victoria, 2016).

Urban governance, policy and leadership theme:

The manual made some reference to the transformational and flexible capabilities of governance. Also demonstrated were collaborative governance approaches to natural hazard risks. Initially, the manual outlined a unified and collaborative policy approach to risk management and mitigation. The close relationship between prevention, risk reduction

and mitigation is detailed, and the interplay between these three factors was emphasised as a unified approach towards risk management (Emergency Management Victoria, 2016). The manual extensively outlined a 'team approach' and detailed specific policy "to ensure a collaborative and coordinated whole of government [sic] approach to the management of emergencies at each tier" (Emergency Management Victoria, 2016, pp. 3-15). A principle of the manual is a collaborative governance approach between municipal bodies, stakeholders and the wider community (Emergency Management Victoria, 2016). Moreover, the manual also incorporated various policy prescriptions that incorporate flexibility, whereby governance can adapt and transform given past events and future outlooks.

Information and engagement theme:

The aspects of social and community engagement permeated throughout the three parts of the EMMV. Initially, the manual established the importance of community engagement and self-organisation for mitigation efforts by stating that "primary responsibility rests with the relevant community or government agencies, although emergency services also contribute greatly to mitigative activities especially in the areas of community awareness and preparedness" (Emergency Management Victoria, 2016, pp. 2-4).

Building upon social and community engagement, the EMMV went to discernible lengths to outline a policy for self-reliance and self-organisation. The manual acknowledged that hazard management is also the responsibility of individual stakeholders within a given community (Emergency Management Victoria, 2016). To this effect, Section 5.1.2, "Preparing for self-reliance [sic]" outlined policies that foster self-organisation and a unified approach (Emergency Management Victoria, 2016, pp. 3-23). Communities must take responsibility for present risks and not leave them for future generations or simply rely on emergency services to deal with events as they arise. The manual stated that "ownership of the risk should not be transferred but stays with the relevant community or agency which is taking responsibility for mitigative action" (Emergency Management Victoria, 2016, pp. 2-4).

Hazard prevention and mitigation theme:

The EMMV articulated various policy prescriptions and policy principles that address or encourage hazard mitigation and prevention. As noted, part two of the manual was specifically devoted to risk management and mitigation in Victoria. This part of the manual delved into various prevention, mitigation and risk reduction policy prescriptions at various municipal levels (Emergency Management Victoria, 2016).

4. RESULTS AND DISCUSSION

This paper set out to investigate how resilience ideas are shaping the ways in which hazard strategies in Australia incorporate complex risk, and the tensions elicited in the transition from protective approaches to resilient management. The outcomes of this case study analysis suggest that the Tasmanian plan (TEMP) signals the greatest progression in framing of resilience management. Overall, the Tasmanian plan substantially incorporated the key attributes outlined in Table 1, and infrastructure and planning were strongly emphasised in the plan. The plan also discussed land-use planning as a tool for natural hazard mitigation and management. Moreover, the TEMP exhibited foresight by explicitly acknowledging the issue of climate change and its implications for hazard management in Tasmania. Accordingly, this ethos also permeated throughout the TEMP's approach to governance. The plan specifically emphasised the importance of adapting to changing environments through research, and applying lessons learned from prior events. The plan also sought a collaborative approach to hazard management, response, mitigation and recovery through collaboration with other municipal bodies and the community. The TEMP extensively provisioned for the involvement of the community, particularly within the prevention, mitigation, preparedness and recovery sections of the plan. For example, the TEMP prescribes for community stakeholder engagement post-disaster. The plan recognised that prevention and mitigation were important to diminishing the effects of natural hazard events, and that these events ought to be prevented if possible. Finally, the TEMP was the only plan that, albeit briefly, discussed discernible prevention strategies and physical ecosystem management (e.g. Active reduction of bushfire fuel) as a means of mitigation or prevention (Tasmanian Government, 2015).

Victoria, much like Tasmania, delivered a seemingly comprehensive coverage of the themes and components of resilience articulated in Table 1. For example, community and stakeholder self-organisation was a strong

point of emphasis within the manual, allowing for grassroots hazard prevention, mitigation and the fostering of greater resilience (Godschalk, 2003).

Of the three plans, the South Australian plan placed the least emphasis on the resilience components outlined in Table 1. The SEMP took an approach that was not as comprehensive or holistic as the approaches taken by the EMMV or TEMP, which incorporated relevant themes and attributes of the resilience construct more palpably. The SEMP took a reactionary approach to natural risk management, whereby the plan established frameworks for responding to hazard or disaster events. It significantly underplayed hazard mitigation and prevention, planning for uncertainty or changing risk paradigms, and the governance flexibility attributes of the conceptual framework. Moreover, while the South Australian plan exhibited strategies for active community engagement, there was no evidence of policy principles to foster or promote self-organisation within the community. However, the plan did comprehensively employ policy that prioritised built infrastructure.

This research revealed some interesting results concerning resilience management within state (Australia) disaster management strategies. The key findings of the reviewed plans revealed a varied degree of articulation of the resilience construct. The plan for Tasmania proved to be the most comprehensive in its coverage of the key themes and attributes of natural hazard resilience. Conversely, the plan for South Australia lacked many key components, highlighting a disparity in approaches between states. However, the review points to early evidence of the embedment of resilience management within Australian disaster management strategies. These important findings lead to the conclusion that policies and strategies are yet to fully embrace and realise the principles of resilience management, however, a gradual shift toward the implementation of resilient management protocols in the Australian context is indeed becoming evident (Coaffee and Clarke, 2016).

The lack of consideration or underdevelopment of various themes of the resilience construct suggests that the strategic directions of Australian states underplay the tangible upshots of greater resilience to a given system. The reasons for not embracing to its fullest extent the concept of resilience in natural hazard and disaster management requires further research. However, one explanation is the functionality of contemporary western municipal governance and planning systems. As Albrechts stated (2010, p. 1123), "unfortunately, many of our politicians and planners still see their role as to prepare and implement decisions, rather than to

empower others". Therefore, transformative practices—which are structurally different from our current ways of thinking—must be instituted to overcome deficits and achieve greater resilience (Albrechts, 2010; Davidson and Arman, 2014). Careful reform and a more radical strategic planning approach is required to implement these practices and ideologies (Davidson and Arman, 2014). This new paradigm must foster a more comprehensive, progressive and holistic approach to the planning and governance of disaster management. Given the detrimental effects of climate change, an approach of this nature is highly pertinent (Intergovernmental Panel on Climate Change, 2007; March, 2016). As Surowiecki (2005) asserted, planners and governments must embrace new ways of thinking and trust their creativity and the wisdom of the public.

5. CONCLUSION

In a modern-era of environmental volatility, it is evident that existing approaches and toolkits are insufficient for tackling the associated challenges. Therefore, "adaptable and reflexive approaches to DRM [Disaster Risk Management] seem appropriate under the changing circumstances described here" (Scolobig *et al.* 2015, p. 3), whereby, acknowledgement that greater self-organisation and learning is required to achieve better practices and frameworks if communities are to be resilient.

This considered, many resilience scholars are divided on whether resilience is to be a process characterised by adaptive capacity or as a measurable property, with many efforts devoted to developing resilience indicators (Wegner 2017). As Meerow *et al.* (2016) affirm, enacting "resilience is inevitably a contested process in which diverse stakeholders are involved and their motivations, power dynamics, and trade-offs play out across spatial and temporal scales. Therefore, resilience for whom, what, when, where, and why needs to be carefully considered" (p. 46).

In this paper three municipal Australian State disaster management plans were reviewed to assess the current positions of contemporary Australian strategies on natural hazard risk management and their understanding and critical development of resilience. Although the plans reflect many of the key identified themes of resilience, it is argued that the plans need to be more discriminatory in their operationalisation of resilience and the activities they support, or they will not lead to adaptive outcomes. Further research is needed to critically assess disaster risk and emergency management frameworks to determine how they contribute to desirable long-term outcomes and how they foster resilience, if at all. Furthermore, although resilience theories have contributed to analysis among

researchers (Wenger 2017), further research is required regarding its utility for practitioners. This requires examination of how resilience theories translate into policy and activities on-the-ground.

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