

Transformative approaches to disaster risk reduction: Social, societal, and environmental contributions to post-disaster capacity building

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Abstract

This paper discusses whether Community Engagement Theory (CET) could be augmented in ways that afford opportunities to develop a framework for understanding how emergent change and transformative learning can occur in disaster response and recovery settings. The foundation for doing so derives from appreciating that CET describes process theory that comprises variables representing adaptive capacities. That is, the presence of these capacities enables people to adapt to any set of circumstances, particularly when people are called upon to make decisions and to act during conditions of uncertainty. This approach builds on the potential for variables such as community participation, collective efficacy, and empowerment to provide a social context for people to formulate and enact strategies to support their recovery and to be able to do so when interacting with government, non-government, and business entities. However, based on a critical comparative analysis of relevant research into post-disaster emergent

and transformational shifts in community capacity, it is argued that the above variables need to be augmented. The paper discusses the rationale for including factors such as community leadership, governance, place attachment, and city identity in an augmented conceptual transdisciplinary transformative learning Disaster Risk Reduction (DRR) model. The function of this model is consistent with the Sendai Framework for DRR Priority 4, Building Back Better goal.

Keywords: *Disaster risk reduction, readiness, preparedness, capacity building, Community Engagement Theory, transformative learning*

The importance of using disaster experience to foster capacity development derives from exposure to (increasingly) frequent hazard events that occur against a backdrop of generally low prevailing levels of pre-disaster preparedness (Abunyewah et al., 2020; Baxter, 2019; Harries, 2008; United Nations Office for Disaster Risk Reduction [UNDRR], 2015; van Valkengoed & Steg, 2019). The work reported here develops a tentative model of emergent capacity development and transformative learning using cases where emergent and transformational learning have been observed but not systematically analysed. The goal of this paper is to critically analyse these previous studies and develop based on this comparative review an evidence-informed conceptual transdisciplinary transformative learning Disaster Risk Reduction (DRR) model that can serve as a source of research questions and hypotheses to support future capacity development and transformative DRR learning research and practice.

The logic underlying exploring a relationship between disaster experience and capacity development derives from postulating that disaster experience provides people with tangible experiences capable of challenging DRR thinking and preparedness decisions and prompting a rethinking of what being prepared for future disasters entails (Paton & Buergelt, 2019). However, an automatic link between disaster experience, transformation, and DRR capacity development cannot be assumed. For example, disaster experience can leave levels of preparedness unchanged (Comstock & Mallonee, 2005;

Dow & Cutter, 1998; Huang et al., 2016) or result in people reducing their levels of preparedness (Johnston et al., 1999; Meyer et al., 2014; Rincon et al., 2001). Notwithstanding, capacity development has been observed.

This paper compares studies in which enduring shifts in capacity change occurred with those studies in which short-term, but unsustained, capacities emerged. This comparison enables us to tentatively identify how disaster experience interacts with the socio-cultural-environmental foundations of DRR beliefs, attitudes, relationships, and practices to facilitate transformational learning that culminates in sustained capacity development. This paper explores how such interactions can act as a catalyst for creating fundamental personal and collective shifts in how people perceive themselves and their world and how they relate to and act towards each other and to the environments they live in and rely on, and so create transformative learning outcomes (Buergelt & Paton, 2022; Mezirow, 2008; O'Sullivan et al., 2002; Paton & Buergelt, 2019; Pelling 2011).

According to O'Sullivan et al. (2002), transformative learning involves “experiencing a deep, structural shift in the basic premises of thought, feeling, and actions” and transformation entails “...a shift of consciousness that dramatically and permanently alters our way of being in the world” (p. xvii). The relevance of the latter for contemporary DRR can be traced to the fact that people's inaction is a major determinant of both their risk and their susceptibility to (avoidable) losses; dramatically altering their way of being in the world is important for ensuring their and other people's survival.

An important facet of O'Sullivan et al.'s (2002) argument is that transformative learning must occur across personal, community, and societal levels of analysis if it is to generate enduring outcomes. This position is consistent with recommendations for DRR capability development to adopt such a holistic approach (Buergelt & Paton, 2014; Twigg, 2015; UNDRR, 2015). This perspective thus becomes a criterion for determining if transformative learning has occurred; it must be novel, linked to collective disaster experience, encompass transformative learning across personal, community, and societal levels of analysis, and be institutionalised in ways that facilitate it being sustainable over time and against changes in the social context (e.g., migration, demographic diversity). We begin this exploratory journey by shining light onto why and how disasters create a space for transformation.

Disasters as Catalysts for Transformative Shifts in DRR Beliefs, Relationships, and Actions

This section of the paper is organised around five case studies that describe varying degrees of shifts in DRR beliefs, attitudes, and relationships in disaster-affected populations. It includes studies from New Zealand, Australia, Japan, Indonesia, and Taiwan. In doing so, this section covers a range of extreme natural events and the diverse cultural and social contexts in which they occurred in ways that meet the criteria for Build Back Better (BBB) programmes described in Priority 4 of the Sendai Framework for DRR (UNDRR, 2015).

In New Zealand, there were some 450 community-led response and recovery initiatives that emerged in the months following the 2010-11 Canterbury earthquakes (including the 22nd February, 2011, Christchurch earthquake). Of these, 231 were established in response to the earthquakes, 167 of them existed prior to the earthquakes, and details of the remaining 55 groups remain unclear (Carlton & Vallance, 2013). The discussion here focuses on the detailed analysis of five of these initiatives, in neighbourhoods that were selected for analysis by the then Ministry of Civil Defence & Emergency Management (MCDEM; now the National Emergency Management Agency) because they identified some interesting dynamics (i.e., four neighbourhoods that adapted well and one that did not). The analysis did not cover activities occurring in other neighbourhoods or communities and so describes only the processes developed in these five areas and their implications for understanding emergent change and transformative learning. The case selection was informed by MCDEM wanting independent analysis of those neighbourhoods to provide more rigorous insights into the recovery processes that occurred (Mamula-Seadon, 2018; Mamula-Seadon et al., 2012; Paton et al., 2014).

The Australian data were obtained from the analysis of Facebook posts collected over the entire response and early recovery phases of the Dunally wildfire in 2013 (Irons & Paton, 2017; Paton & Irons, 2016). In Japan, data used to support the arguments presented combined an analysis of historical accounts of community responses to the 1914 Taisho eruptions and of the contemporary influence of processes that developed following the 1914 eruption and the continued eruption activity at Sakurajima volcano (Kitagawa, 2015; Paton et al., 2013; Paton, Jang, et al., 2017). The Indonesian analyses draw on the development of the *smong* process on Simeulue Island (Kanamori et al., 2010; Sutton, Paton, Buergelt, Meilianda, et al., 2020; Sutton, Paton, Buergelt,

Sagala et al., 2020). The data from Taiwan were collected to capture recovery experiences following the 1999 Chi Chi earthquake and 2009's Typhoon Morakot (Paton, Jang, et al., 2015; Paton et al., 2016).

A common denominator across these studies was people's ability to recognise that their pre-existing DRR beliefs and practices, or lack thereof, contributed to the losses they experienced. It was also evident that this recognition, and the circumstances in which people found themselves, did result in either new ways of applying existing capabilities and/or the development of new ways of thinking and acting, some of which translated into new and enduring DRR capacities and capabilities. These different outcomes are described as repurposed, emergent, and transformative learning outcomes (Paton et al., 2022). The differences between these are discussed below. Before doing so, the paper first outlines the criteria applied to describing an outcome as transformative learning.

The criteria used here to differentiate transformative learning from other kinds of learning are as follows. Firstly, there must be a discernible link between a disaster and transformation and this link must be mediated by evidence that the roles of the diverse social actors involved in the disaster are instrumental in facilitating, enabling, and sustaining new ways of thinking and acting that culminate in new institutionalised and sustainable socio-structural processes. This reflects O'Sullivan et al.'s (2002) argument that transformative learning involves complementary beliefs and actions that encompass personal, community, and societal levels of analysis. In the examples discussed below, the existence of transformative socio-structural processes is evident in these processes being institutionalised, given specific names, and entailing processes for sustaining their roles well after the disaster that catalysed their origins has passed into history.

The above criteria differentiate transformative DRR learning from other changes that can be introduced into local and national DRR policies and practices after an event, but which are not adopted within the social and cultural fabric of the society or region. This line of argument does not negate the importance of emergent responses such as new processes developing or adding new components to existing relationships. However, for these new processes to persist and to fully realise the benefits of the BBB goals established by the Sendai Framework, attention needs to be focused on transformative learning that represents fundamentally new ways of thinking and acting shared by all key

stakeholders and that persist over time (Paton et al., 2022). Examples of these different outcomes will be provided below to clarify these distinctions.

The role of how *repurposing* and *emergent* outcomes enabled people's ability to respond to the disaster response and recovery challenges encountered is illustrated using analyses of people's accounts of their experience of disasters in New Zealand, Australia, and Taiwan (Irons & Paton, 2017; Paton, Jang, et al. 2015; Paton et al., 2014). Data for the New Zealand and Australian cases were collected during the recovery phases of the respective disasters. The data from Tung Shia in Taiwan were sourced 3 years post event but at a time when recovery was still underway. In all cases, people were consistent in agreeing that their pre-event preparedness was inadequate (particularly regarding their structural, psychological, and community preparedness). Another common denominator was agreement that their disaster experience acted as a catalyst for new DRR beliefs and actions.

In New Zealand, data were sourced from thematic analysis of life course focus groups with residents from five affected neighbourhoods in August 2011. This allowed the data to capture people's experiences from the February 2011 earthquake through to August 2011 and included the analysis of people's responses to the February earthquake, how they developed neighbourhood processes over time, and how their learning experiences influenced their response to major aftershocks in June 2011. This provided insights into what helped or hindered people's responses. Four focus groups described how their need for novel personal and collective responses following the 22 February 2011 earthquake derived from recognition of absence of formal assistance. The fifth group initially decided to wait for government response, with this hindering neighbourhood and leader development (Mamula-Seadon et al., 2012; Paton et al., 2014).

The analyses provided examples of how people's responses were supported by their *repurposing* of pre-existing knowledge and skills. For example, residents with trades and building skills would apply these in novel circumstances by helping neighbours repair their damaged homes. Participants also discussed how their pre-existing sense of social responsibility was repurposed into mobilizing social support activities within neighbourhood settings.

The data also furnished examples of emergent capacity building. For example, emergent capacity building

was evident in the development of family negotiation practices (Paton et al., 2014) that facilitated families making collective decisions. These decisions ranged from deciding to stay in Christchurch during aftershocks, to assisting local recovery activities, to developing planning processes to manage family resources and planning family entertainment, to providing a family stress management resource.

Emergent outcomes were also evident at the neighbourhood level. For example, neighbours collaborated to create a collective resource for managing local issues such as securing water resources, organizing repair crews, and supporting elderly neighbours and others in need (Paton et al., 2014). These emergent neighbourhood relationship-building activities fostered the emergence or strengthening of social capacities, including people's sense of (local) belonging, with these collective activities helping to build people's collective capacity to manage aftershock consequences and to provide social support resources to help manage stress. The effectiveness of the latter was heightened by the emergence of community leaders (McAllan et al., 2011; Paton et al., 2014). Emergent local leaders helped empower community action, helped manage conflict, encouraged social inclusivity in recovery tasks, and facilitated neighbourhood links with government agencies, NGOs, and businesses to facilitate access to relevant recovery resources.

The analysis of recovery experiences in Taiwan supported the New Zealand findings and introduced additional repurposing and emergent capabilities (Paton, Jang, et al., 2015). Thematic analysis of Taiwanese data following the "921", or Chi Chi, earthquake (Paton, Jang, et al., 2015) reiterated both the importance of community self-reliance in initial response settings in which government and external support was not available, and the key roles community leaders played in facilitating community self-reliance. However, while local leadership in New Zealand was an emergent resource, in Taiwan it represented a repurposed resource; it reflected how local community leaders played community management roles in everyday community life. Tung Shia residents discussed how (repurposed) spiritual beliefs reinforced their sense of purpose throughout their recovery, fostered their perseverance in recovery tasks over time, enabled the provision of social support and collective stress management, and sustained reciprocal support and belongingness over time (Paton, Jang, et al., 2015).

Taiwanese respondents identified devolved governance practices that established local reconstruction centres as

an emergent community-agency level capacity (Paton, Jang, et al., 2015; Paton et al., 2016). Additional insights into emergent processes came from analysis of social media response and recovery data of a Facebook page developed specifically to support recovery from a wildfire events in Australia in 2013 (Irons & Paton, 2017; Paton & Irons, 2016). This approach to data collection also afforded a way to acquire "real time" insights into resident's experiences in situ and over time.

An important emergent outcome here was the ability of this virtual community to increase the relevance, local meaningfulness, and timely delivery of information for diverse residents in ways that was meeting the needs of families with children and/or elderly residents (Irons & Paton, 2017). A related emergent outcome was the role that Facebook played in providing social support and developing an emergent sense of community that expanded to include those in the affected community and those outside the area who could help facilitate locally relevant self-help activities. Another emergent outcome was how the Facebook page functioned to integrate top-down (e.g., agency, NGO) and bottom-up (community-based) communication in ways that helped create a sense of "collective intelligence" across local and government stakeholders. The latter outcome was reinforced by the role that emergent community leaders played in coordinating recovery activities.

The discussion above illustrated how repurposing and emergent capacity development can enhance people's adaptability in complex and dynamic recovery settings. However, an issue here concerns the fact that in the New Zealand, Australian, and Taiwanese examples discussed above, the emergent processes dissipated once conditions stabilised. Hence, they do not satisfy the criteria for being labelled transformative learning outcomes. There are, however, other cases which satisfy these criteria. Examples from Japan (Kagoshima), Indonesia (Simeulue), and Taiwan (Ho-Ping) are used to illustrate transformative learning.

The 1914 Taisho eruption of Sakurajima volcano provided the impetus for civic leaders, scientists and community members in Kagoshima to engage in a transformative learning journey whose outcomes have persisted for over 100 years (Kitagawa, 2015; Paton et al., 2017). The process was triggered by the mayor's reflecting on his underestimating the value of local knowledge and experience. The transformative learning process was developed around a community engagement strategy founded on community development principles that was designed to regenerate trust in civic authorities

and to engage and empower citizen DRR. The process encouraged residents to a) take and exercise responsibility for their own safety (personal *agency*), b) engage in collective activities to enhance their being *knowledgeable* about volcanic hazards and how to respond to them, and c) accept the value of learning to co-exist with the natural volcanic environment (Paton et al., 2017). These processes culminated in citizens combining environmental co-existence beliefs (*kyozon*) and personal agency and knowledge within a *kyojo* (helping each other through cooperative commitment) framework to enable transformative DRR beliefs and practices that persist to the present day through social activities and festivals (Kitagawa, 2015). Another example of enduring transformation occurred on Simeulue (Indonesia).

In the aftermath of a significant tsunami in 1907, Simeulue islanders' reflection on the impact the tsunami created was a catalyst for transformation in islanders' relationship with tsunami events and resulted in their coining a new term to describe this transformative learning outcome: *smong* (Sutton, Paton, Buergelt, Meilianda, et al., 2020; Sutton, Paton, Buergelt, Sagala et al., 2020). *Smong* contains four elements: (a) Jika gempa kuat (If there is a strong earthquake), (b) Jika laut surut (If the sea recedes), (c) Lari ke gunung (Run to the mountains), and (d) Ngakk menunggu -lari saja! (Don't wait—just RUN!). Sutton and colleagues' research discussed how the social and collective maintenance of *smong* through the roles of community leaders and respected elders, especially grandmothers, created a transformative learning outcome that reconciled people's knowledge of tsunami precursors with their acceptance of their responsibility to act should these signs be detected. The DRR importance of *smong* was evident in the very low death toll on Simeulue compared with what happened on the Indonesian mainland during the 2004 Indian Ocean tsunami.

As in Kagoshima, the Simeulue experience provides another example of the hallmarks of transformative learning; collective reflection on a catastrophic disaster led local leaders, community elders, and citizens to collectively engage in a transformative learning process that resulted in the development of *smong* and new socially-embedded processes around *smong* which have persisted and remained effective for over 100 years. The next example of transformation originated in the Taiwanese township of Ho-Ping.

When Ho-Ping's residents found themselves isolated for several months following the "921" earthquake, they

had to develop new ways of organizing their recovery to compensate for their lack of pre-existing community DRR capability (Paton et al., 2016). The ensuing transformation combined community development activities with forging new relationships with NGOs and government agencies (cf. community participation, collective efficacy, empowerment, trust) to create an enduring "community consciousness" DRR capability. The socio-structural process, labelled as community consciousness, remained active in 2017 (the Chi Chi earthquake occurred in 1999).

A common denominator in the Kagoshima, Simeulue, and Ho-Ping cases was evidence of DRR processes that become entrenched in the socio-cultural-environmental fabric of the respective islands, cities, and townships. Furthermore, these transformational practices persisted over time. In contrast, the Christchurch, Dunnally, and Tung Shia cases demonstrated emergent social learning, but learning that was not institutionalised to carry these lessons forward. The contrasting emergent versus transformative learning affords opportunities to explore the transformative DRR learning process. What can be gleaned from such analyses is introduced in the next section.

The Social Context of Post-Disaster Transformative Learning

The occurrence of shifts in DRR beliefs, relationships, and actions were evident in all cases discussed (Kitagawa, 2015; Mamula-Seadon, 2018; Paton et al., 2014; Paton et al., 2017; Paton et al., 2016; Sutton, Paton, Buergelt, Meilianda, et al., 2020; Sutton, Paton, Buergelt, Sagala et al., 2020). The processes and outcomes reported included the development of social support practices, emergent neighbourhood response and recovery resources, and empowering relationships with NGOs and civic agencies (see also McAllan et al., 2011). However, a difference was evident between the Kagoshima, Simeulue, and Ho-Ping cases and those in Dunnally, Tung-Shia, and Christchurch regarding whether emergent change translated into transformational learning outcomes.

In Kagoshima, Simeulue, and Ho-Ping, emergent social capabilities were further transformed into sustained social-structural processes. In Dunnally, Tung-Shia, and Christchurch, this final consolidation did not occur, and the emergent processes dissipated over time. The exploration of what influences emerging capabilities transforming permanently commences with examining

whether an explanation could derive from differences in the social competencies that emerged.

In all cases, comparable social competencies emerged. The data indicates the emergence of several processes that map onto the community participation, social inclusivity/social justice, collective efficacy, empowerment and trust, sense of community, and place attachment constructs. These variables are recognised for their capacity to facilitate people's ability to coherently construct meaning in uncertain, novel, and challenging conditions, formulate plans and implement solutions to cope with or adapt to novel and challenging conditions, and inspire action by connecting people and people to place (Abunyawah et al., 2020; Baxter, 2019; Earle, 2004; Levac et al., 2012; Lion et al., 2002; McAllan et al., 2011; Monteil et al., 2020; Paton, 2019; Silver & Grek-Martin, 2015; van Valkengoed & Steg, 2019).

Because of this interpretive and mobilizing functionality, the social competencies that emerged are categorised here as core competencies involved in *enabling* transformative learning. That is, they facilitate, for example, the shared sense making capability and collaborative problem solving and planning competencies required to enable adaptation to or the development of novel approaches to dealing with challenge and change irrespective of its source. These enabling processes make the inclusion of the core competencies that enable transformative learning in a conceptual model of transformative DRR learning appropriate (see Figure 1). However, while providing a foundation for transformational learning, the core competencies do not predict it per se. It thus becomes pertinent to search for

those factors that enable transformative DRR learning to occur.

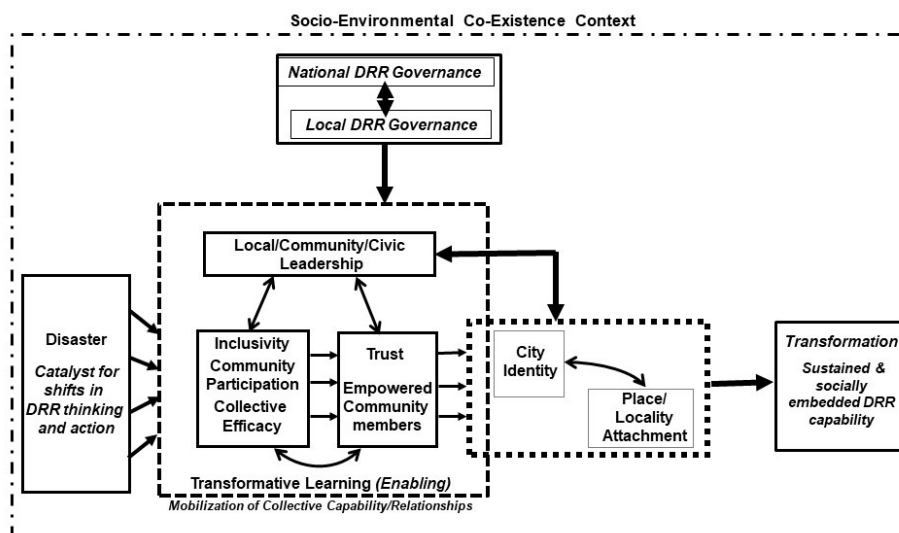
To explore the factors enabling transformative DRR learning, it becomes necessary to broaden the search for factors that could account for differences between cases regarding the emergence of sustained psycho-ecological-cultural-social-structural processes. One possibility lies with the relationship between local leadership and the social and environmental settings in which leaders operate.

In all the studies discussed above, local leaders played key roles in mobilizing social competencies and facilitating their application to recovering and rebuilding activities in each location. Local leaders developed, for example, functional neighbourhood recovery groups and social support resources. However, evidence that leaders functioned in this way in all cases suggests that local leadership per se is not a transformation enabler. However, how circumstantial factors affected leader ability and opportunity may illuminate how this enabling process might work.

There is a body of DRR research identifying how certain environmental influences affect leadership tenure and impinge on leader capacity to facilitate the consolidation of transformative processes (Baxter, 2019; James & Paton, 2015; Thaler & Seebauer, 2019). Factors such as leaders having to terminate their roles early due to, for instance, exhaustion and need to attend to family and livelihood needs, and lack of leader succession planning affect leader tenure and thus their ability to consolidate learning outcomes over time (Baxter, 2019; McAllan et al., 2011; Thaler & Seebauer, 2019). Given that time is required to consolidate emergent outcomes into sustainable social-structural systems and processes, a constraint on facilitating the latter outcome would arise if leaders were not available over the extended period required. To what extent and how could the time aspect help explain the differences in enabling consolidation of transformative outcomes as discussed above?

In Kagoshima, the Mayor's leadership tenure extended well beyond the event itself, as did the roles of community leaders in Simeulue and Ho-Ping (Paton et al., 2015, 2016; Paton,

Figure 1
Summary of the DRR Transformative Learning Process



Jang et al., 2017; Sutton, Paton, Buergelt, Meilianda, et al., 2020). Their consequent availability over the longer term ensured the leadership continuity required to facilitate the consolidation of emergent outcomes into social-structural systems and processes. In contrast, in New Zealand and Australia, the tenure of community/neighbourhood leaders ended when the recovery process stabilised (Irons & Paton, 2017; Mamula-Seadon et al., 2012; McAllan et al., 2011; Paton et al., 2015; Paton et al., 2014). In New Zealand, there was some consistency in leadership expertise at a Mayoral level as one Christchurch Mayor was replaced by another with just as much experience in recovery, as their previous role had been a local Member of Parliament. However, despite this, the lack of longer-term incorporation of leadership at a neighbourhood level was evident. In the New Zealand and Australian cases this could have deprived neighbourhoods and communities of a key leader resource over the longer time frame required to facilitate consolidation. This finding makes it important to support a diversity of emerging leaders, ensure that they can provide ongoing leadership (e.g., long-term employment and funding), and identify and build up the capacity of people emerging as future leaders to enable them to facilitate the consolidation of transformative processes (McAllan et al., 2011). Attention to selecting and training local leaders must also be accommodated (McAllan et al., 2011; Thaler & Seebauer, 2019).

Leaders need intra-personal, inter-personal, and organisational skills to inspire, coordinate, and facilitate activities occurring at neighbourhood, locality, or community levels, especially building and maintaining trusting and effective relationships. Governance systems and policy frameworks used by NGOs, businesses, and government agencies need to support the cultivation of these processes and competencies (McAllan et al., 2011; Paton et al., 2015). This introduces another potential transformative learning enabler: how local leader engagement in governance influences the consolidation of social structural processes (McAllan et al., 2011; Pelling, 2011).

Governance and Transformative Learning

Countries that invest in governance policies, and the institutional structures and relationships to implement them, significantly enhance their DRR capabilities (UNDRR, 2020). The content and implementation of such processes play crucial roles in creating the social and societal scaffolding required to support community engagement in developing and applying both national and local DRR strategies (UNDRR, 2020). The introduction

of local governance to the present discussion provides additional insights into transformative learning and the social and societal consolidation of its outcomes.

A significant reason for including local DRR governance (and how it complements governance at national levels) in a conceptual model derives from the fact that large-scale disasters create impacts that are distributed, qualitatively and quantitatively, unevenly over the total area of impact; consequences can vary significantly from place to place depending on how hazard impacts interact with diverse socio-environmental circumstances. Local DRR governance processes are more likely to be responsive to such local-level variability and so are better suited to identifying and using the unique local resources and meeting the unique local needs that arise within different areas or localities.

Local governance has been identified as a driving force for developing the capacity of neighbourhood and community groups to create social and environmental change within their jurisdictions (Dhakal, 2012; Lyth et al, 2016; Middlemiss & Parrish, 2010). Effective local governance has the capacity to support diverse community members and organisations at the relevant scales to continuously co-create, co-enact, and co-evaluate new adaptive DRR systems and processes in response to the novel social and environmental conditions emerging during (local) disaster recovery and rebuilding.

Local governance processes are also more likely to develop in ways that facilitate developing shared responsibility in which citizens, civic agencies, and government continuously identify and contribute complementary knowledges, competencies, and resources regarding DRR (Aiken et al, 2017; Buergelt & Paton, 2022; UNDRR, 2020). Such approaches are better suited to functioning in ways that increase opportunities for adaptation and post-event holistic capacity-building including social-structural processes (Banwell et al, 2018; Mamula-Seadon, 2018; McNamara & Bugey, 2017; Middlemiss & Parrish, 2010; Paton, 2008, 2019; Sarzynski, 2015). Placing additional emphasis on local governance does not, however, negate the importance of national DRR governance (Figure 1). Because national DRR governance can, for example, facilitate passing on capability (i.e., enable adoption of DRR lessons in all jurisdictions, not just in those affected by a specific event), expedite the sourcing and distribution of resources needed at local levels, and support development through regulatory frameworks, it

remains important (Bajek et al., 2008; Bhandari et al., 2010).

In Kagoshima, Simeulue, and Ho-Ping, local formal and informal leaders were the local mayor or highly respected community elders who accepted responsibilities for managing city or community affairs before, during, and after their respective disasters (James & Paton, 2015; Kitagawa, 2015; Paton et al., 2016). Hence, they held positions which included their having responsibility for developing and then enacting (local) community governance mechanisms that were responsive to local DRR needs. Consequently, it can be postulated that local formal and informal leaders engaging and being engaged in creating, enacting, and constantly refining local governance could have helped consolidate emergent DRR systems, processes, and capabilities in ways that embedded them within everyday social life.

In contrast, in New Zealand and Australia, residents adopting emergent community leadership roles did so only during the recovery stages of their respective events, did not hold formal civic leadership roles or responsibilities, and often found themselves in conflict with civic leaders (James & Paton, 2015; McAllan et al., 2011; Paton, Jang, et al., 2015; Mamula-Seadon, 2018; Thaler & Seebauer, 2019; UNDRR, 2020). The consequent disconnects between these local informal leaders and their lack of, or limited involvement in, formal governance development systems and processes limited their opportunities to inform the advancement of local governance in ways required to consolidate emergent social processes into enduring DRR beliefs and practices.

In Kagoshima, Simeulue, and Ho-Ping, local governance systems and processes emerged through bottom-up community engagement processes that facilitated diverse perspectives to be included and harnessed, leading to socially transformative outcomes (cf. O'Sullivan et al., 2002). In Australia, no local governance process emerged that could support consolidating the emergent social processes. In New Zealand, the national government did implement specific governance processes for the Christchurch event via the Canterbury Recovery Earthquake Authority (CERA) and the Canterbury Earthquake Recovery Act 2011. However, though the government had a local presence, their top-down governance systems and processes not only constrained but suppressed the consolidation of emergent informal social-structural systems and processes into formal local DRR social structural capabilities (Mamula-Seadon, 2018; Paton et al.,

2014). The problems inherent in circumstances where national processes undermine local processes has been documented in other studies (Cretney, 2018; Thaler & Seebauer, 2019). For example, Thaler and Seebauer (2019) found that top-down governance practices that limit civic involvement to playing support roles rather than enabling and strengthening local formal and informal leadership (e.g., through recognizing the need for bottom-up and top-down processes to play complementary roles) diminish the effectiveness of DRR governance. Thaler and Seebauer consequently advocate for more emphasis on citizen-driven governance initiatives that facilitate sustainable local capacity development. While the latter describes the processes operating in Kagoshima, Simeulue, and Ho-Ping, there was nothing comparable in Australia and New Zealand.

Hence, government and support agencies at different scales must empower and strengthen local formal and informal leadership by genuinely and continually giving up power and involving community stakeholders in co-creating, co-implementing, and co-evaluating local governance systems. Governance systems and processes must facilitate citizens and organisations sharing information two-way and making decisions in ways that harness diverse perspectives and resources and fulfil the needs and interests of everybody (Beunen et al, 2017; Paton & Buergelt, 2019; Sarzynski, 2015; Uittenbroak et al, 2019). However, this potential will only be realised if steps are taken to ensure genuine and authentic working together and to safeguard against public participation being relegated to playing tokenistic roles in the development and implementation of governance systems and processes (Beunen et al, 2017; Paton & Buergelt, 2019; Uittenbroak et al, 2019).

As a tentative starting point for accommodating such circumstances in a conceptual model, we propose here to include variables sourced from Community Engagement Theory, particularly collective efficacy, empowerment, and trust (Paton, 2008, 2013; Paton et al., 2013). Effective local participatory governance can be linked to community development strategies because this governance is capable of enabling the emergence of social competencies. Examples of these can be found elsewhere (Paton & Buergelt, 2019; Paton, Kerstholt, et al., 2017).

It is also important to progress beyond just describing this aspect of a conceptual transformative learning DRR process and consider how such complementary relationships could be created in practice to support this goal. One way of doing so involves including sociocracy

systems and principles in recovery governance planning. Sociocracy offers governance systems and processes that empower all DRR stakeholders in ways that enable socially just approaches to self-governance via collaboratively sharing knowledges, solving problems, and creating inclusive, consensual mutually beneficial futures (Buck & Villines, 2017; Buergelt et al., 2020). These outcomes confer upon sociocracy a capability to facilitate the emergence of the “social justice” transformative principle advocated by O’Sullivan et al. (2002). Sociocratic processes can be implemented in parallel with existing governance structures, enabling smooth transitions towards governance mechanisms better suited to facilitating individual and collective transformations in intentional and gradual ways (Buck & Villines, 2017; Buergelt et al., 2020). Sociocracy systems and processes point towards new ways of operationalizing and evaluating inclusive governance systems and processes. These new ways could include the degree of existence of distribution of power among all members, circles and double links between circles, two-way communication flow between circles and members, consensus decision-making, and inclusion of all members and especially diverse members. New ways could also include the degree to which governance systems are harnessing diversity to generate innovative solutions, giving responsibility to each member and holding each member to account.

The implementation of these participatory governance systems and processes through which government agencies engage with disaster-affected communities also needs to be considered. This was evident in the Kagoshima case which illustrated how local government facilitated transformative learning. Governments are not, however, the only body external to a community involved in post-disaster settings. Acknowledgement of the role that government and humanitarian NGO agencies play in disaster recovery contexts makes it pertinent to consider how to ensure that their involvement complements and strengthens other transformative DRR capacity building initiatives, particularly those emerging within affected communities (Arneson et al., 2017; Paton & James, 2016). This consideration is especially important if this is accompanied by emphasizing accommodating the historical, cultural, social, economic, and political characteristics that affect both how communities engage with external agencies and how social learning occurs (Baxter, 2019; Buergelt & Paton, 2014).

The strengths-based approach to the capacity building holistic approach seeks to regenerate and connect

existing psychological, ecological, cultural, sociological, and spiritual resources into new, holistic, and sustainable capabilities for responding to future challenges and adversity (Buergelt & Paton, 2014; Buergelt et al., 2017; Kapucu & Liou, 2014; Matin et al., 2018; Mosel & Levine, 2014; Norris et al., 2008; Paton & James, 2016; Spialek & Houston, 2019). By using sociocratic governance and strengths-based approaches, government and NGO agencies can support post-disaster transformative DRR capacity building. Their role in this regard thus warrants inclusion in the conceptual model (Figure 1). Another source of transformative enablers reflects the role of city, neighbourhood/location (place), and natural environmental beliefs and relationships.

Environmental Context: City, Place, and Natural Settings

One potential transformative enabler is the city identity construct. The existence of research that links the effectiveness of city (local) governance with the quality of city identity (Ginteng et al, 2017; Healey, 2006; Kong, 2007; Peng et al, 2020) also indicates that it is pertinent to consider a role for city identity.

City identity. While regarded as an under-researched entity in studies of environmental hazards (Berking, 2012), the city is emerging as a construct with implications for understanding DRR capability development (Bhandari et al. 2010; Kitagawa, 2015). In Paton et al.’s (2014) study in Christchurch, several focus group members specifically identified the referent for their emergent spatial attachment as Christchurch city, reinforcing a need for exploring how city identity might inform how to conceptualise a transformative DRR process. As the recovery evolved, people’s spatial attachment to the city of Christchurch was also seen emerging in debates about the future of the Christchurch cathedral, the pop-up art in the City Centre, and some of the planning initiatives where the public were asked to suggest ideas for the city’s regeneration (e.g., “Share an Idea”) (Cretney, 2018). Further research on sense of place in the Christchurch context has highlighted its value in terms of recovery wellbeing (Prayag et al., 2021).

This position is reinforced by work identifying how city identity can act as a medium for facilitating the effectiveness of city (local) governance (see above) by facilitating place-based connections between people and events over time (Ginteng et al, 2017; Healey, 2006; Kong, 2007; Peng et al, 2020; Winstanley et al., 2015). So, how can city identity be defined and how might it motivate and/or sustain transformative DRR

processes? City identity arises from, for example, the city's distinctive visual elements such as architectural features and parklands and socio-cultural activities and festivals (Adams et al, 2009; Bhandari et al., 2010; Kong, 2007; Lynch, 1960). People's engagement with these elements over time leads to the emergence of communal experiences, beliefs, values, norms, and patterns of behaviour that influence how people, individually and collectively, interpret and respond to challenging environmental circumstances (Paasi, 2013).

From a transformative learning perspective, it can be postulated that city identity characteristics (e.g., architectural characteristics, festivals) influence people's sense of connectedness in ways that motivate commitment to act to build and sustain their city connections and development of emergent transformative capabilities (Bhandari et al., 2010). Hence, by virtue of its influence on fostering the emergence of a new collective culture (Paasi, 2013), there exist grounds for considering how city identity can emerge as a post-disaster transformative enabler. However, city identity is not the only spatial characteristic capable of motivating transformation. Place attachment and identity are also important.

The role that constructs of place attachment and place identity play in facilitating DRR is indicated in research using the CET (Frandsen et al., 2012; Paton et al., 2012; Paton et al., 2008) and in other studies (De Dominicis et al., 2015; Silver & Grek-Martin, 2015). Our discussion of the role of place attachment in transformative DRR commences by considering the relationship between city and place identities.

Place: Locational and neighbourhood influences.

Cities are environmentally complex and comprise locations that have varied relationships with their environment (e.g., river, coastal, topographic features) (Rademacher, 2015). Depending on one's location within a city, the hazards people experience will vary from one location/neighbourhood to another, as will people's sense of connectedness to their neighbourhood or locality/location.

Concepts of place attachment and identity can motivate people's engagement in collective community DRR actions (Bhandari et al., 2010; Frandsen et al., 2012; Monteil et al., 2020; Paton, 2019; Paton et al., 2008; Seebauer & Babicky, 2017; Silver & Grek-Martin, 2015). This view posits that people, individually and collectively, can be emotionally connected to place and source part of their identity from that place, making it valid to consider including multiple geographical/spatial levels of analysis,

with "place" becoming embedded features of a city, when conceptualizing how spatial connectedness influences adaptation and transformation.

The position adopted here portrays city and place attachment and identity as representing complementary locational influences on people's DRR thinking, with place attachment operating at the locality, home, or neighbourhood level and city identity as an overarching construct in which places are embedded (Bremmer et al, 2020; Devine-Wright, 2013; Healey, 2006). For city identity and place attachment/identity to be hypothesised as playing complementary roles in motivating adaptive and transformative responses, a mechanism linking them is needed (Bajek et al., 2008; Bhandari et al., 2010; Saunders & Becker, 2015). Consequently, including interdependent roles for city identity and place attachment/identity constructs in a tentative conceptual transformative DRR learning model is warranted (Figure 1). Another potential transformative enabler is people's relationship with the natural environment.

Socio-environmental relationships and co-existence.

Introducing a role for socio-environmental relationships in a conceptual model of transformative DRR acknowledges the importance of including an environmental dimension in DRR (Buergelt & Paton, 2014; Buergelt et al., 2017; Buergelt et al., 2022; O'Sullivan et al., 2002; Twigg, 2015). Evidence of transformative social-environmental learning was found in several study cases. Socio-ecological beliefs emerged as transformative outcomes in Kagoshima (e.g., the emergent *kyozon* construct encompassed the development of DRR practices that included learning to co-exist with an active volcano), Simeulue (e.g., *smong* stories and songs identifying the importance of understanding and being responsive to natural warning signs of tsunami), and Ho-Ping. However, comparable emergent beliefs were evident in neither the New Zealand nor the Australian cases. It is important to note that the New Zealand and Australian work discussed here comprised predominantly non-Indigenous people.

The inclusion of the Aboriginal and Torres Strait Islander or Māori populations, who traditionally embrace more ecocentric beliefs, could have provided a different perspective (Ali et al., 2021; Buergelt et al., 2017; Buergelt et al., 2022; Kenney et al., 2015; Tassell-Matamua et al., 2021). Without having undertaken this research there are some examples that highlight the potential of socio-ecological beliefs in transformative outcomes. For example, Māori communities' beliefs combined with experiences of earthquake response

and recovery following the Christchurch earthquake (along-side other subsequent disaster events) has likely prompted transformative social-environmental change in terms of better incorporation of Māori collaboration in DRR and emergency management processes (e.g., from national directives to local DRR) (Jayasinghe et al. 2020).

The development of more socio-environmental co-existence beliefs increases people's knowledge and understanding of nature, their relationship with nature, and environmental challenges, which can support developing adaptive capacities and strategies to safeguard oneself when the environment that confers lifestyle, amenity, and livelihood opportunities periodically turns hazardous. As evident in the application of the *kyozon* construct in Kagoshima, enhanced environmental knowledge can translate into increased adoption of pro-environmental DRR strategies (Charlesworth & Okereke, 2010; Buergelt & Paton, 2014; Paton, Buergelt, et al., 2015; Woodgate & Redclift, 1998). The pursuit of a socio-environmental contribution to transformative learning is warranted by it emerging as a component in this process (e.g., *kyozon* in Kagoshima).

Modelling Transformative DRR Learning

The various transformative DRR learning aspects, and their interactions, canvassed above are summarised in a conceptual transdisciplinary model of transformative DRR learning (see Figure 1). In this model, disaster experience is depicted as a catalyst for transformation. The relationship between disaster experience and transformation is first mediated by the emergence of several social and relationship competencies that support diverse community recovery processes (e.g., community participation, collective efficacy, empowerment). These competencies are described as enabling competencies to reflect their representing adaptive capacities that can support the development of diverse short-term recovery practices and potentially more substantive and enduring social-structural processes.

However, while these enabling adaptive capacities emerged in all case studies, in only some were they linked to the development of sustained social-structural processes. Factors proposed to account for the differences included governance and contextual influences on leader capability, such as local leader engagement in local governance processes, and cultural influences on the adaptive functioning of place attachment especially the degree of collectivistic characteristics. Thus, to account for differences between cases regarding the development of sustained social-

structural processes, the model proposes moderating roles for local leadership and national governance (Figure 1).

The relationship between enabling social systems and processes and the consolidation of transformative DRR processes is mediated by the nested relationship between city identity and place attachment/identity and local DRR governance. This relationship portrays key facets of the transformative learning process consolidating as comprising two interconnected sets of factors. The first set of factors includes those that motivate interest in developing more functional systems and structures in places people feel connected to (city identity and place attachment). The second set of factors entails those related to local participatory governance processes that enable sustaining the vision inherent in emergent processes and create the continuity required for consolidating processes in ways that ensure inter-generational transmission. As local leadership is fundamental to the latter, it is depicted as playing a moderating role in Figure 1. National governance is portrayed similarly to reflect how it can affect, for example, regulatory frameworks and resource procurement and distribution in ways that empower local action.

While the model gives centre stage to community enabling processes that derive from local initiative, it also accommodates the fact that government and NGO agency involvement to some degree will be inevitable, primarily through adopting strengths-based strategies designed to integrate community development and risk management strategies. While agency involvement is depicted as influencing community competence development and empowerment of affected community members, the heavier weight assigned to the arrows linking agency and community highlights the need to emphasise the empowering facet of this relationship. Key roles in this process are played by local leaders in engaged, inclusive, and competent communities being able to reconcile the relational and locational identities of their members, with transformation of emergent change into sustained capabilities being further influenced by complementary relationships between local and national governance frameworks.

The model acknowledges the fundamental socio-environmental co-existence context in which transformative DRR process are situated. The dashed line surrounding the enabling and consolidating processes is intended to signal it having an overarching role.

Limitations

There are several issues that qualify the findings presented. The inability to predict when and where a disaster will occur makes it generally challenging to conduct pre-event studies. The works discussed here are no exception. The fact that this introduces a tentative quality to the model presented and the rationale for its origin has, however, only limited implications for the goal of the paper to develop an exploratory conceptual model of transformative DRR learning by drawing on evidence derived from re-analysing several historical and contemporary studies undertaken by or involving the first author and supporting the model development process with relevant research. The rigour this integrative process brought to the re-analysis affords opportunities to use the conceptual model to guide future research questions and hypotheses, and to design practical capacity building intervention.

Despite the limitations resulting from the absence of pre-event comparative data in the contemporary studies of transformative learning in Ho-Ping, Christchurch, and Tasmania, several factors support the validity of the re-analysis. In Kagoshima, Simeulue, and Ho-Ping, the social-structural transformations discussed all emerged, and are acknowledged as such in historical and contemporary accounts, as a direct consequence of a specific event. Their social-structural characteristics are evident in their having persisted for over 100 years (in Kagoshima and Simeulue) and for some 10 years in Ho-Ping (at the time the research was undertaken). In each case the emergent transformation has been documented (see above).

In the Australian case, data were obtained from a Facebook page specifically set up to create a social (media) resource to plan for, manage, and support people's recovery. This was an emergent enabling resource, and one whose influence on social capacity building clearly emerged from the analysis (Irons & Paton, 2017). The analysis also showed that once recovery was stabilised this recourse was progressively used less and neither became nor triggered the emergence of an enduring social-structural process.

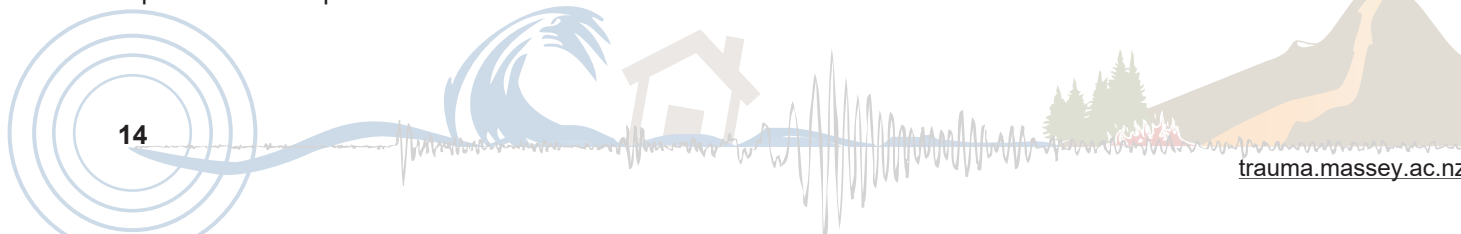
In the New Zealand case study, the analysis revealed that all respondents discussed how the beliefs, relationships, and actions discussed in this paper emerged because of their disaster and recovery experiences, providing evidence of transformative learning being linked to the experience of a specific disaster. This conclusion was

reinforced by the analysis of the interviews identifying how aftershock experiences contributed to the continued development of participants' social competencies, at least during the first 8 months of the recovery. It was also telling that one focus group comprised members of a pre-existing community group who discussed how neither their prior history as a group nor their having an established leader supported their ability to adapt. On the contrary, the analysis of the data from this focus group identified how they experienced enduring problems because of their group processes and leadership failing to provide the kinds of social recovery competencies identified by members of other focus groups (Mamula-Seadon et al., 2012; Paton et al., 2014). This finding adds further weight to concluding that the Christchurch data offers evidence of transformative capacity building arising as a direct consequence of how experiencing a disaster enabled and consolidated social-structural processes.

Conclusion

This paper offers a conceptual transdisciplinary transformative learning DRR model developed from a comparative review of studies of disaster-affected localities where emergent enabling socio-cultural processes were consolidated into enduring DRR capabilities. As stated at the beginning of our paper, we hope that our model can serve as a valuable starting point for further qualitative and quantitative research that further expands our model, sheds light onto specific dimensions of our model, and tests implicit and explicit hypotheses.

This model provides, for example, a starting point for systematically exploring and developing enduring individual and social transformative DRR learning. Investing in research into the nexus of DRR and transformation is becoming increasingly important in a world where a combination of limited DRR capability in the various disaster management phases and the escalating likelihood of societies and their citizens experiencing increasingly complex, repetitive, intense, and persistent natural hazard activity means that disasters will become too frequent facets of the lives of peoples around the world. The discussion here does not in any way negate the vital importance of facilitating pre-event DRR capability. However, pre-event strategies can be complemented by systematically facilitating how the transformative phoenix of DRR capability can rise from the ashes of increasingly prevalent disasters.



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