Disasters as Opportunities for Change

Towards Sustainability

by

Katja Brundiers

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Graduate Supervisory Committee:

Hallie Eakin, Chair
Adenrele Awotona
Daniel Sarewitz

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ABSTRACT

Scholars have highlighted the role of disturbance and crisis, including disasters, in enabling systemic change towards sustainability. However, there are relatively few empirical studies on how individuals and organizations are able to utilize disasters as opportunities for change towards sustainability. This dissertation addresses three questions applied to two case studies: First, what changes were pursued in the aftermath of disasters, and to what extent did these changes contribute to sustainability? Second, how were people (and their organizations) able to pursue change towards sustainability? Third, what can be learned about seeing and seizing opportunities for change towards sustainability in disaster contexts and about sustaining those introduced changes over time?

The research entailed the creation of a theoretical framework, synthesizing literature from disaster studies and sustainability transition studies, to enable cross-case comparison and the appraisal of sustainability outcomes (Chapter 1). The framework was applied to two empirical case studies of post-disaster recovery: the 2004 Indian Ocean Tsunami in Aceh, Indonesia (Chapter 2), and the 2010-2012 series of earthquakes in the greater Christchurch area, New Zealand (Chapter 3).

The research revealed no systemic change towards sustainability in either case, although change towards sustainability was pursued in various areas, such as housing, educating, caring, and engaging in governance. Opportunities for sustainability emerged at different points following the disaster; change processes are ongoing. The sustainability changes were supported by "Sustainability Change Agents" (SCAs): people who were able to see and seize opportunities for change towards sustainability in the

midst of disaster. SCAs were characterized as individuals with various attributes, starting

with an ability to perceive opportunities, catalyze others to support this risk-taking

endeavor, and stay in the endurance race. The study concludes with some

recommendations for interventions to inform pre-disaster sustainability planning. These

avenues include a toolbox and a curricular approach that would educate and enable

students as future professionals to see and seize opportunities for change towards

sustainability in disaster contexts (Chapter 4).

DEDICATION

"People see the opportunity for realizing certain wishes that remained latent and unfulfilled under the old system. They see new roles that they can create for themselves. They see the possibility of wiping out old inequities and injustices. The opportunity for achieving these changes in the culture lends a positive aspect to disaster not normally present in other times of crisis." (Fritz, 1996, p. 57)

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the opportunity to continue these conversations in the future. A special and heartfelt "Thank You!" goes out to Hallie, who always met me where I was, even when it was difficult to get there, helped me discover and reconcile diverse perspectives, and supported my intellectual, professional, and personal growth in deep ways.

I thank my husband, Arnim Wiek, my whole family, and my dear friends for their loving support and for staying connected with me while I was preoccupied with my research.

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INTRODUCTION

Scholars have highlighted the role of disturbance and crisis in enabling systemic change towards sustainability (IPCC, 2012; Olsson et al., 2006). For example, disasters can, under some circumstances, serve as catalysts of such change (Pelling & Dill, 2010). While accelerating progress towards sustainability is urgent, there are only relatively few empirical studies on how individuals and organizations were able to utilize disasters as opportunities for change towards sustainability.

My dissertation addressed the following research questions: First, what changes towards sustainability were pursued in the aftermath of disasters, and to what extent do these changes represent progress towards sustainability? Second, how were people (and their organizations) able to pursue change towards sustainability in the context of disasters: who were the actors and what were their actions, tactics, and resources? Third, what can be learned about pivotal factors for success or failure for seeing and seizing opportunities for change towards sustainability in disaster contexts and about sustaining those introduced changes over time? Fourth, how can change agents be trained in order to support their efforts to pursue change towards sustainability in the context of disasters?

To address these questions, I first developed a theoretical framework, synthesizing literature from disaster studies and sustainability transition studies. The framework allows documenting, analyzing and comparing case studies and appraising to what extent disaster-affected places were able to push change towards sustainability (Study 1). Next, I conducted two empirical case studies, choosing the disaster recovery processes from the devastating 2004 Indian Ocean Tsunami in Aceh, Indonesia (Study 2), and from the 2010-2012 series of earthquakes destroying the greater Christchurch area,

New Zealand (Study 3). The insights from these studies motivated a fourth study exploring a curricular approach, which would educate and enable students (primarily in sustainability degree programs) as future professionals to see and seize opportunities for change towards sustainability in disaster contexts (Study 4).

Positioning the Research

With its focus on how people were able to see and seize opportunities for change towards sustainability in the context of disaster, this research aims to understand the actors' sustainability goals and reconstruct their pathways towards achieving these goals. This approach may seem rather unusual and insensitive to the immense pain and loss that people have just endured because of the disaster. Other scholars and professionals, who started to work in this field decades ago, made similar observations, and yet found constructive ways to see "the magic and the hardship" that occurs during disasters as one respondent in the Christchurch case study said (CC_54). For example, Charles Fritz, a disaster sociologist, attempted in 1961 to publish his research of past years documenting "the positive, beneficent, and therapeutic personal and social effects of disaster," in order to understand how to leverage the supportive and enabling principles that can emerge among disaster survivors. He found that "many people are likely to reject these questions as incredible because they believe that the deaths, injuries, physical destruction, and personal deprivations caused by disasters must inevitably produce pathological personal and social consequences" (Fritz, 1996, p. 1). Similarly, Rebecca Solnit who researched collective action for positive social change during disaster mentioned that some reviewers critiqued her work arguing that one can't be hopeful while suffering. In contrast, Solnit

found that "people who are suffering are hopeful," because "the alternative to hope would be to surrender to the horrible things that menace them" (Taylor, 2009, p. 13). Therefore, addressing this misconception, Solnit (2009) called her book "A Paradise Built in Hell" explicitly acknowledging that disasters are hell and that sometimes people can build a paradise in it, particularly when the disaster is experienced as "a kind of awakening … to possibilities, not the celebration of calamities." (Taylor, 2009, p. 15)

More broadly, beyond the field of disaster research, a normatively positive research focus on how people deliberately attempt to solve a problem and how they can strengthen capacities and assets in the pursuit of a better world, are typically not scrutinized in critical social analysis (Pelling & Dill, 2010). Critical analysis thus often remains focused on the first of what Wright (2010) has identified as three approaches to disaster: that of diagnosing and critiquing the sources of harm in existing institutions.[1] However recent developments in the literature indicate an increasing theoretical and empirical interest in research on sustainable solutions pathways across a variety of fields pertinent to disaster studies, including peace studies (Deutsch & Coleman, 2010), public health (Robinson & Sirard, 2005), sociology and social change (Wright, 2010), science-technology and science-policy (Sarewitz et al., 2012), global environmental change (IPCC, 2012; Wise et al., 2014) and sustainability science (Miller et al., 2014). Leach et al. (2010) call for sustainability science to discover ways that help to support and

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[1] The second approach of critical social analysis entails researching the set of institutions that would create the most emancipatory institutions, while thinking systematically about a theory of alternatives, otherwise, one turns to the ideas that seem immediately possible. The third approach entails researching and testing these theories of transformation, researching the character of institutions that could change the sources of harm (Wright, 2010).

empower those sustainable solutions pathways that are aimed at building capacity of the poor in order to increase the transformational potential of those approaches. Similarly, in the domain of disaster, human development, and resilience studies, Brown & Westaway (2011) argue that a shift from a focus on deficits to a focus on strengths and how to promote those is necessary, and finally underway.

In parallel, Mathie and Cunningham (2003) have summarized some of the negative consequences resulting from the type of needs-based approaches and problem-oriented inquiries that have been conventional in development practice. Organizations, intending to address an identified need, start playing up the severity of the problem to access funding and maintain the commitment of the institutional arrangements that funds their operations. As a result, the intended beneficiaries start to identify with the problem, perceiving themselves as deficient and incapable; as recipients who relay on outsiders to help, instead of as empowered citizens. In contrast, Mathie and Cunningham (2003) argue, asset-based approaches and strength-oriented inquiry tend to inspire positive action for change and help bring to the fore visions and diverse forms of latent social capital. Specifically related to themes of my own research, Manyena et al., (2011, p. 423) advocate for an understanding of resilience as the ability to bounce forward: "to see disaster as an opportunity for local livelihood enhancement rather than as a simple return to status quo ante." Manyena et al. (2011) argue that this forward looking conceptualization demands that researchers rethink ideas around structure and agency, that recovery planning recognize the reality changes already brought by disaster, and for both to acknowledge people's potential to adopt positive behavior changes before and after disasters. O'Brien sees the optimistic framing of human capacities to influence

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future developments in the era of climate change as a key "adaptive challenge," because it calls for a questioning of values, loyalties, and beliefs, including those about human-environment relationships (O'Brien, 2011, p. 670).

In my research I accounted for these two strands: I adopted (i) a solutions-oriented research perspective by reconstructing pathways of change towards sustainability and (ii) the optimistic framing of human abilities in disaster situations by interviewing people involved in sustainability change efforts how they were able to pursue them. With this approach, I endeavor to contribute to research "that helps us to understand how to deliberately transform systems and society in order to avoid the long-term negative consequences of environmental change" (O'Brien, 2011, p. 673).

My approach was generally well received, as some local efforts had begun working in similar directions. In the Christchurch context, the two strands were reflected in the highly political discourse around its disaster recovery. First, the notion of seeing disasters as opportunities for positive change was epitomized in a series of essays in the book "Once in a Lifetime: City-building after Disaster in Christchurch" (Bennett et al., 2014). The book recounted how various opportunities were seen and some were successfully pursued, but also relayed how many opportunities were foreclosed, mostly by the powers that be; in particular by leadership of central government and the Canterbury Disaster Recovery Authority. Research was undertaken to document how opportunities for positive change were pursued in such areas as the health sector (Stevenson et al., 2014) and disaster recovery related to the impactful response and recovery process organized by Māori. Here, the authors identify the Māori effort as an important counterpoint to the "many articles that focus upon Māori [and] are over-

determined by a deficit thinking approach" (Kenney et al., 2015, p. 10). Agencies as well as civil society groups drew on approaches related to asset-based community development and positive psychology in developing programming for mental health (D'Aeth, 2014) and community engagement (i.e., Project Lyttleton).

In the Aceh context, the situation was more complicated as the tsunami disaster enabled the end of more than 30 years of what could be called a drawn-out social disaster – the civil conflict. In both forms of crisis, the idea of disaster as opportunity was present, e.g., seizing opportunities to build back better after the tsunami disaster (UN 2006) and to advance a peace-agreement (Renner & Chafe, 2007; Fan, 2013). Nevertheless, realizing the opportunity through ideas of promoting peace through building back better beyond a minimalist security agenda, proved difficult (Shah & Lopes Cardozo, 2014). The complications and shortcomings of the disaster recovery in Aceh and in other tsunami-affected countries, led to the emergence of an invaluable body of critical research (e.g., Bello, 2006; Pandya 2006; Gunewardena & Schuller, 2008). However, few accounts illuminated people's efforts towards positive transformation in extremely challenging circumstances. These include among others an internationally unprecedented disaster recovery process enfolding within the context of a post-conflict society in need of reconciliation processes, a political leadership comprising of ex-combatants, and an increased role of religion in politics as well as the impacts of broader Indonesian politics (c.f., Nicol, 2013; Trustrum, 2014).

Seizing the opportunities in the compounded case of Aceh was further complicated by the different psychosocial responses to the natural and social disaster, respectively. Fritz (1996) argues that one reason why disasters, such as those triggered by

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a natural hazard, offer opportunities for personal and social change is that their causes can be identified as coming from the outside; whereas in other crises, threats arise within the system and it is difficult to identify and widely agree upon their cause. In Aceh, this inside-outside juxtaposition was more complicated as a population's worldview and religious outlook affects whether and how people are able to perceive opportunities for change in the midst of a natural disaster. In Aceh, it was apparent that disasters occurring through natural hazards are often associated with an act of god, which makes disaster risk reduction, disaster preparedness, and perceiving opportunities for change in disaster contexts challenging. One of the major faith-based organizations in Indonesia has now started to address this challenge by formulating a new theology of the environment (Rokib, 2012). Furthermore, the civil conflict could not easily be perceived and specified as coming from the outside system, or from an external force. It was people living in Aceh, sometimes within the same geographic communities, who sided with different parties involved in the conflict. The role of worldviews and religious outlooks combined with a compounded disaster might be one reason why realizing opportunities for change towards sustainability was more complex and difficult in Aceh; other reasons relate more specifically to disaster recovery activities. In future work, I am interested to explore the role of spirituality for leveraging windows of opportunity to advance change towards sustainability.

While these factors make it difficult to talk about disasters as opportunities for change towards sustainability, the literature reviewed above nevertheless underscores the importance to explore and focus on pathways for positive adaptation and transformation,

especially in situations with such devastating effects. Eckersley (2008) notes that it is critical to be mindful of

> "the stories we create to make sense of what is happening and to frame our response. A key task is to ensure that these stories reflect neither the decadence and degeneracy of nihilism nor the dogma of fundamentalism but the hope and creative energy of activism." (Eckersley cited in: Fritze et al., 2008, p.8)

Holding hope and providing stories of hope is important when aiming to see and seize opportunities for change towards sustainability. As one of the interview respondents in Christchurch said: "Without hope, people perish" (CC_54). Sharing experiences may motivate others to join this effort for change towards sustainability; or at least open up visions of alternative recovery pathways in situations where people feel they need to wait for the government-led disaster recovery process to lead the return to normal, as observed by one respondent in Christchurch (CC_47). Furthermore, Fritze et al. (2008, p.7) argue that when "people have something to do to solve a problem, they are better able to move from despair and hopelessness to a sense of empowerment." I hope this research—sharing the work of SCAs in Christchurch, NZ, and Aceh, Indonesia—contributes such stories of hope and inspires future sharing of ideas, energy, and a sense of belonging to an emerging network.

Research Approach

This research pursued the following overarching research questions: (1) What changes towards sustainability were pursued in the aftermath of disaster and to what extent do these changes represent progress towards sustainability? (2) How were people

(and their organizations) able to pursue change towards sustainability in the context of disasters: who were the actors and what were their actions, tactics, and resources? (3) What can be learned about pivotal factors for success or failure for seeing and seizing opportunities for change towards sustainability in disaster contexts and about sustaining those introduced changes over time? (4) How can change agents be trained in order to support their efforts to pursue change towards sustainability in the context of disasters?

To address these questions, I first developed a theoretical framework, conducted two case studies, and synthesized findings from the case studies and literature review into a proposal for education and capacity building of sustainability change agents working in disasters.

As for the empirical case studies, I chose the cases of the disaster recovery processes after the 2004 Indian Ocean Tsunami devastating large parts of the coast of Aceh, Indonesia, and the 2010-2012 series of earthquakes destroying vast areas in the greater Christchurch area, New Zealand. I chose these two cases as prior research suggested that the pursuit of sustainability goals was a declared goal of the disaster recovery (Bappeda Aceh, 2012; Miles et al., 2014). Furthermore, temporal considerations ensured the research takes place in an opportune time: the later phases of recovery are comparable to everyday situations (Stallings, 2006) and psychosocial vulnerability of disaster-affected populations is reduced compared to the acute situation during the disaster relief phase. Moreover, both cases were approaching mile-markers of their long-term recovery efforts: Christchurch entered its fifth year, with central government officially shifting from disaster recovery to regeneration programs and the province of Aceh prepared for its 10th anniversary, including a large international meeting,

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commemoration celebrations, and academic conferences taking stock on the disaster recovery efforts related to the 2004 Indian Ocean Tsunami. I also accounted for different socio-economic contexts, with Christchurch, NZ, being a wealthy and stable city in a developed nation, while Aceh, Indonesia, emerged from years of deprivation and civil conflict in nation that is in political and economic transition. Lastly, access was another criterion. Access refers to the ability to enter the research field, create opportunities to expand the initial network of contacts through a snowball method, and find ways to embed myself in local processes in order to develop experiential context-specific knowledge. For both cases, I developed collaborations with research counterparts on site, which allowed me to share and discuss my research approach, identify initial contacts for interviews, and reflect research experiences and findings. As much as these research counterparts enabled access to the field; they also structured it because of their engagement with and perspectives of the disaster recovery process. For the Aceh case study, my research counterpart was the Resilience Development Institute in Bandung, Indonesia, directed by Elisabeth Rianawati and Dr. Saut Sagala. Additionally, I became a visiting scholar at two research centers in Aceh: at the Tsunami Disaster Mitigation Research Center (TDMRC) and at the International Center for Aceh and Indian Ocean Studies (ICAIOS). In Christchurch, I was a visiting scholar at the University of Canterbury, which enabled me to work under the guidance of Dr. Bronwyn Hayward, Head of Department of Political Science. Furthermore, I started to collaborate with the local NGO "Sustainable Otautahui Christchurch (SOC)."

I conducted three months of fieldwork in each location, starting with fieldwork in Indonesia, during which the 10th anniversary of the Indian Ocean Tsunami and 5th

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anniversary of the Christchurch earthquakes, respectively, were observed. Fieldwork was anchored on semi-structured interviews (n= 46 in Christchurch and n = 50 in Aceh) with people leading efforts of change towards sustainability or aspects thereof.[2] In my research, I refer to these people as Sustainability Change Agents (SCAs) in disaster times. This term is shorthand for those people who self-identify as a change agent and pursue sustainability goals while taking either a holistic or select approach to sustainability (Myers & Beringer, 2010). The term does not imply that SCAs have been or will be successful, rather it speaks to these people's intentions and practices as a result of their intentions and in response to their circumstances and the broader context.

I worked with my research counterparts and with the snowball method in order to identify those people who were recognized in the community as mobilizing efforts towards sustainability or towards select goals of sustainability. Furthermore, I strove to identify contacts working in different sectors of society and on different scales (local to international), including civil society, not-for-profit, and non-governmental organizations, businesses, and government entities, as well as related to different daily activity fields, such as e.g., housing, caring, engaging in governance, recreating (Kahneman et al., 2004).[3] This approach is informed by my theoretical framework (chapter 1), which recognizes sustainability-oriented disaster recovery as a holistic endeavor affecting all areas of daily life (Awotona & Donlan, 2008). Furthermore, the

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[2] In total I conducted 80 interviews in Indonesia and 60 in New Zealand, but as I used the snowball method, some of these interviews provided context and access to the people involved with sustainability initiatives.

[3] Each of these categories (government, business and third-sector entities) entails more analytical aspects as it can be broken down in separate sub-groups, whose different and potentially complementary foci and capacities could be leveraged to support change towards sustainability.

framework conceptualizes the work of the Sustainability Change Agents as embedded in context; whereas the context is understood as a complex adaptive socio-ecological system (Folke et al., 2010). As a result the group of SCAs interviewed shared a sustainability-related future orientation and the intention to advance change towards sustainability; yet they were heterogeneous in terms of demographics, worldviews, and political affiliations. The SCAs' different socio-economic status and positions in society engendered different avenues to decision-making processes and power, which influenced their practices to pursue change towards sustainability post-disaster as well as the outcomes of their initiatives.

I focused on the SCAs' work, as my research is interested in transitions towards sustainability in a disaster context and little empirical research exists exploring human agency for sustainability in disaster contexts. The SCAs in my research have been identified through the snowball method as pursuing sustainability transitions, leveraging the disaster context for their pursuits. My primary focus on the SCAs in this project is also justified by Tierney (2012, p. 358) who argues that the sustainability perspective needs more consideration in disaster governance, vis-à-vis and in conjunction with other perspectives, such as disaster risk governance and environmental management in order to understand "how disaster governance regimes change and learn over time." While this research focused on the SCAs, it accounted for these other perspectives from the viewpoint of the SCAs, in particular, because the SCAs typically did not work alone. As will be discussed further below, those SCAs who were able to succeed with their sustainability initiatives over time engaged in collaboration with likeminded people and with others (including their perceived opponents) in order to advance and institutionalize

change. The collaborative element brought awareness about and knowledge of the other groups' perspectives into the SCAs' perspectives and practices.

I conducted semi-structured interviews with the SCAs. The approach to the interviews was guided by the concept of "appreciative inquiry" (Eliott, 1999). Appreciative inquiry works from the premise that "reality is socially constructed [and internalized], and that language is a vehicle for reinforcing shared meaning attributed to that reality" (Mathie & Cunningham, 2003, p. 478). Its purpose is to support emerging positive change processes in organizations or communities. Thus, appreciative inquiry uses interviews to draw out peak experiences of past processes, successful efforts, and positive memories, recognizing that memory and imagination, while essential to support change, are also flawed in terms of objective empiricism (ibid, p. 478). Although the interviewees explored the changes towards sustainability, they did not gloss over the challenges associated with these efforts and adversities related to the disaster recovery. On the contrary many interviewees started the interview by discussing the opportunities missed and sharing their frustration with incumbent disaster governance arrangements. The interviews were complemented through participant observation, which included partaking in volunteering activities, public meetings, and site visits to places of disaster recovery. Additionally, I had opportunities to share and discuss my research in both locations at conferences, in public meetings, and in informal discussions with my research counterparts. There were two formal opportunities for sharing: initial insights were shared at the end of fieldwork (2015)[4] and research results were shared towards the

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[4] Insights from fieldwork: Christchurch, NZ: Public meeting hosted by Sustainable Otautahi Christchurch on April 16, 2015. Jakarta, RI: Public meeting hosted by the Australian Indonesian Facility for Disaster

end of the research (2016)[5]. The presentations shed light on how practitioners understood the notion of disasters as opportunity for change towards sustainability and what they took away for potentially informing their future practices. Some of these insights are summarized in the concluding chapter. In turn, my presentation of the plethora of efforts in the sustainability arena allowed practitioners to appreciate the diversity of changes and efforts, as they naturally have a more myopic view on select aspects of the disaster recovery processes given their focus of work (Turnheim et al., 2015).

This research was exploratory, trying to identify the SCAs, the outcomes of pursued changes towards sustainability (sustainability appraisal), as well as the SCAs' practices and processes leading to these outcomes, using a proposed framework for analysis. This approach is "by necessity eclectic" as one professor in New Zealand, doing similar work, observed. Many of the researched initiatives as well as their actions and outcomes are not systematically recorded because they are bottom-up initiatives with little capacity for documentation. The exploratory approach also engendered adjustments to my questionnaire and interview approach. Initial interviews in Indonesia suggested the need to simplify the questions and reduce the overall number of questions to a set of four major points. This adjustment offered respondents the space to tell their stories according to their own terms rather than making them answer questions. The story-telling approach seemed more appropriate considering that I asked people questions that refer back to

Reduction (AIFDR) on April 30, 2015. Banda Aceh, RI: Public lecture hosted by the Tsunami Disaster Mitigation Research Center; May 7, 2015; Internal meeting hosted by the Bappeda Kota Banda Aceh (Development Planning Agency of Banda Aceh Municipality); May 8, 2015.

[5] Research results: Jakarta, RI, Public meeting hosted by UNOCHA on Sept. 9, 2016; Christchurch, NZ, Public meetings hosted by Sustainable Otautahi Christchurch on Sept. 15 and 16 and public lecture hosted by the University of Canterbury on Sept 9.

situations and actions that happened five or 10 years ago, which they found at times difficult to recall. Furthermore, in light of the emerging findings related to the sustainability appraisal I started to change my language from "disasters as opportunities for transformative change to sustainability" to "disasters as opportunities for change towards sustainability." This adjustment reflects the perspective of some respondents who started out enthusiastically and now feel disillusioned because they see no such thing as sustainability; meanwhile my research revealed smaller and bigger efforts towards sustainability (and the contextual threats and pressures constraining these efforts).

Because of the exploratory nature of this research the interaction with respondents was more consultative than collaborative. Nevertheless on the basis of the relationships and shared insights established through this research, I now feel better prepared to engage in more reflexive ways in the future. The experiences of my dissertation have given me confidence that researching sustainability transitions in the context of disasters might benefit from a collaborative and co-creative approach (during the disaster recovery phase), which helps reconstructing past pathways and appraising their sustainability outcomes in systematic and inclusive ways as well as co-constructing options for moving forward on the these pathways.

What This Research Entails

In chapter one, I provide an overview of how scholars in the fields of disaster studies and sustainability transition studies have conceptualized change in disaster and sustainability transitions, as well as ideas around the notions of windows of opportunity for change or leveraging disaster as opportunity for change, respectively. The chapter

proceeds to synthesize these conceptualizations into a theoretical framework, which allows analyzing, comparing, and appraising processes that attempt to leverage disaster for changes towards sustainability, while permitting the specific geographical and socio-demographics of a specific location to remain salient. I apply the framework to a few case studies from the published literature of disaster affected places and their efforts to leverage opportunities created by disaster, to both test the framework as well as identify some factors for success and failure that are reflected across these case studies.

The framework and the insights from the secondary case studies obtained through the literature, sets up chapters two and three, which present the results from the case studies in Aceh, Indonesia and Christchurch, New Zealand. Both case studies preface their findings by presenting the context, within which Sustainability Change Agents worked (before, during and after the disaster), accounting for the contextual factors, which enabled or hindered the work of SCAs. The findings include the sustainability appraisal, which showed mixed results in both cases as well as the attributes characterizing the SCAs and their practices. The practices reflect the structured sequence proposed in the literature of seeing and seizing opportunities and sustaining those introduced changes over time (c.f., Westley et al., 2013).

While the research identified a variety of avenues for future interventions intended to support the work of SCAs in disaster times, the fourth chapter focuses on one of these avenues, which is the educational route. The Institute of Medicine (2015) concludes that if organizations are to seize opportunities to build healthy, resilient, and sustainable communities after disaster, they will need to ensure that two broad sets of stakeholders are brought together as they too often work in isolation. These are

individuals and organizations that (A) plan for and carry out disaster recovery and those that (B) plan for and build healthy and sustainable communities. Hence, the fourth chapter explores how sustainability programs in higher education could evolve to not only educate and train sustainability change agents advancing sustainability in normal times (group B), but also in disaster times (group A). Designing and offering such a curricula requires collaboration between sustainability and disaster risk management programs and with organizations working in sustainability or disaster risk management on the ground.

Lastly, I conclude with a brief report on practitioners' and stakeholders' comments how they perceive the framework and its components as tools for leveraging sustainability initiatives during disaster recovery. Additionally, I juxtapose the practices used by the SCAs in Aceh and in Christchurch, discussing their similarities and differences, and pointing out those practices that are discussed as important steps in those communities of disaster management and humanitarian aid that are concerned with sustainability. The conclusion ends with addressing the shortcomings of this research and offers future research questions, some of which aim to address those limitations while others continue to deepen the line of work in light of the findings.

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SEIZING POST-DISASTER WINDOWS OF OPPORTUNITY FOR CHANGE TOWARDS SUSTAINABILITY. FRAMEWORK AND CASE STUDIES

Abstract

In the face of an increasingly urgent global need to change course to achieve sustainability goals, scholars have highlighted the role of disturbance and crisis in enabling systemic transformation. Disasters, in particular environmental disasters, are recognized as a catalyst of such change. Nevertheless, the question is how people can mobilize disaster contexts for desirable shifts. Observers of transitions following disaster divide efforts to introduce and direct change into two groups: efforts that result in reinforcing existing inequalities and status quo, and more bottom-up efforts that engage alternative visions of sustainability in development. While the former has been the subject of detailed studies, there are relatively few empirical studies on the alternative story: how individuals and organizations in disaster-affected areas were able to see and seize opportunities for change towards sustainability. Nevertheless, there is increasing recognition of the need to better understand the "positive sides of disaster" (Agrawal, 2011) and how they can help advance sustainability. Yet, learning from cases is challenging as there are relatively few empirical cases and there is no shared framework that allows documenting, analyzing and comparing across diverse cases as well as appraising the contribution to sustainability. Therefore, this study asks two questions: (1) What is a robust framework that allows analyzing and comparing cases, appraising each case's progress towards sustainability, and identifying pivotal factors critical for success or that pose barriers? (2) What are these pivotal factors that emerge across the initial set

of cases? The study proposes a framework and applies it to a small set of cases, which purportedly leveraged opportunities created by disasters to advanced sustainability. This allows for testing the framework's applicability and identifying a preliminary set of pivotal factors. The study contributes initial insights for individuals and organizations trying to prepare for sustainability-oriented disaster recovery. Furthermore, it offers a way to catalogue future case studies in order to comparatively document the pathways and practices communities used to succeed in seizing opportunities for change towards sustainability in disaster contexts.

Introduction

In the face of an increasingly urgent global need to change course to achieve sustainability goals, scholars have highlighted the role of disturbance and crisis in enabling systemic transformation (Olson & Gawronski, 2003; Birkmann et al., 2009; Pelling & Dill, 2010; Agrawal, 2011). Crises not only may break material barriers to change but also unsettle deep-seated ideas and question assumptions about the meaning and drivers of past and current practices. While such transformative change occurs within people, it can translate to and manifest in communities and their larger institutional and infrastructure systems. Within the range of possible crises that could serve to generate systemic change, environmental disasters stand out in terms of their potential to destroy the built environment, disrupt social organization, and challenge the fundamental values and identity of place and people. Disasters are catalysts of change; yet can opportunities created by disasters be leveraged to mobilize desirable systemic shifts towards sustainability?

Some argue that disasters open windows of opportunities (Birkmann et al., 2009) that allow introducing and directing formal and informal changes, as a window of opportunity creates constellations where resources, people, and willingness to act, come together to realize novel ideas (Lakoff, 2010). Observers of transitions following disaster divide efforts to introduce and direct change in the context of disasters into two development trajectories (Olson & Gawronski, 2003; Pelling & Dill, 2010): efforts that result in reinforcing or aggravating existing inequalities and pre-disaster status quo, and efforts that engage alternative visions of sustainable development. In the former case— recently also coined as "disaster capitalism"—corporate interests collaborate with municipal and state entities, effectively aligning their interests around neoliberal policy reforms, which often result in benefiting elite interests while aggravating the situation for already disenfranchised communities (Klein, 2007; Gunewardena & Schuller, 2008). For example, Gotham and Green (2008, p.1055) show how entrepreneurial approaches used for disaster reconstruction in New York after 9/11 and New Orleans after Hurricane Katrina, in particular tax incentives and subsidies, benefitted "large firms and high-income residents, with little to no benefit for low- and moderate-income people." As market-based approaches replace public accountability in decision-making processes, they increase inequitable distributional effects. In the other case, individuals and organizations leveraged the disaster as opportunity to pursue change towards sustainability. These initiatives can emerge bottom-up, top-down, and as combinations thereof (Turnheim et al., 2015). For instance, the Tawahaka community in Krausirpi used the disaster recovery process to effectively change land tenure rules, creating access to livelihoods for previously marginalized groups in the community (McSweeney &

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Coomes, 2011). The people in Greensburg seized the window of opportunity to launch a sustainable recovery, turning Greensburg into "Greentown, the greenest town in rural America" (Swearingen-White, 2010). An example of an international effort of reconstruction and transformation post Hurricane Mitch is the so-called Stockholm Declaration, a mutual commitment between donors and the Central American Governments about future development priorities and reduction of socio-ecological vulnerabilities. While it did not succeed, it helped to inform some positive changes (Frühling, 2002)[6].

Nevertheless, while cases of "disaster capitalism" are well documented, there are relatively few empirical studies on the alternative story: how individuals and organizations in disaster-affected areas were able to see and seize the opportunities for change towards sustainability. Meanwhile, scholars note that it is time to learn from these "sustainability" cases in order to effectively support future efforts that aim to leverage post-disaster windows of opportunity "to create orchestrated regime shifts" towards sustainability (Solecki, 2015). Such research on the "positive sides of disaster" is not insensitive to the deep concerns of loss and destruction associated with disasters (Agrawal, 2011). However, it recognizes that in all disaster contexts, it is necessary to think through the future, bringing together goals related to sustainable disaster recovery, disaster risk reduction, and sustainable development.

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[6] The Declaration resulted in marginal impacts for Costa Rica, El Salvador, and Guatemala; whereas in Honduras and Nicaragua it has effectively informed development plans and poverty strategies, including anti-poverty strategies (Frühling, 2002).

There are challenges to learning from these "sustainability" cases. Evidently, accounts of complex social change processes tend to be subjective: there is so much complexity that one can almost find evidence for any outcome depending on how one approaches the problem, which itself depends on the values and interests of the observer. Nevertheless sustainability, while normative, is not entirely subjective; there are widely agreed principles, such as defined through the United Nation's Sustainable Development Goals that can be observed in terms of what has happened (facts on the ground) and what diverse actors perceive and feel has happened in relation to their needs and expectations. This means we need a framework that relates the sustainability principles to views of different stakeholders embedded in the place. Currently, there is no shared framework that allows documenting, analyzing and comparing across diverse cases. The empirical "sustainability" cases referenced above employ diverse frameworks drawing on theories of innovation, socio-ecological systems, and adaption. Similarly, the theoretical work on windows of opportunities in the areas of disaster studies and sustainability transformation research draws on a diversity of traditions and often don't relate to each other. Some also acknowledge that their proposed frameworks need yet to be tested (c.f., Westley, et al., 2013).

This study aims to address these two research gaps. The objectives of the study are to (1) to develop a framework that allows analyzing, appraising and comparing "sustainability" cases as well as identifying pivotal factors that are critical for success or that pose barriers or lead to failure; (2) to do an initial analysis of these "sustainability" cases, applying this framework, in order to identify a preliminary set of success factors and barriers, which can be used for future cases. The guiding questions are: (1) What is a

robust framework that allows analyzing and comparing cases (cross-case comparison), and identifying pivotal factors critical for success or failure? (2) What are these pivotal factors that emerge across the initial set of cases?

The study proceeds as follows. The next section reviews the conceptual frameworks proposed in the areas of disaster and sustainability transformation studies that explain mechanisms related to efforts aimed at introducing and sustaining change and at leveraging the window of opportunity in particular. Section 3 synthesizes these proposals into a framework. Section 4 applies the framework to cases from the secondary literature in which transitions to sustainability have purportedly been pursued. Section 5 discusses the value of the framework and insights about key factors for leveraging opportunities created by disasters.

Literature Review

The concept of "Windows Of Opportunity" (WOO) has emerged in a diversity of approaches to social and environmental change, with many drawing on Kingdon's (1995) conceptualization of policy windows. I focus on two domains of research pertinent to the notion of WOO following disasters: disaster studies and sustainability transition theories.

Disaster studies and their conceptualization of change. Disaster studies offer rich insights that help explain mechanisms related to the WOO and factors that influence change towards sustainability. A foundational concept is the pressure-release model, which conceptualizes change as resulting from two opposing forces: vulnerability of people, livelihoods, and ecosystems that has progressively built up and is exposed to and impacted by hazards. The impact and ensuing changes are shaped by the layers of

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vulnerability resulting from a combination of unsafe conditions, dynamic pressures, and root causes. To reduce pressure, vulnerability needs to be reduced (Wisner et al., 2004). The model also draws analytical attention to the three contexts, before disaster, during, and after the disaster, and their interactions.

With respect to the pre-disaster context, Penning-Rowsell et al., (2006) found that discourses and debates, even unrelated to the event and ensuing disaster, are likely to become the dominant themes following a disaster in the absence of alternative ideas. Others suggest that interactions between NGOs, state entities and local communities aimed at building communities' capacity for natural resource management help build latent adaptive capacities, which are catalyzed through the impact and influence what emerges during disaster recovery (Agrawal, 2011).

Scholars also draw attention to the need to distinguish disaster impact from changes following suit after disasters, arguing that disaster impact assessments need to be understood in the broader context of concurrent and ensuing post-disaster socio-ecological changes, as these further shape the disaster's impacts and disaster recovery. Post-disaster changes include formal and informal, as well as directed and undirected processes (Birkmann et al., 2009). The destructive and devastating power of hazards shatters ecosystems, habitats, infrastructures, and institutions, as the disaster reveals the malfunction of the current governance system and past decisions as well as the values that led to these protracted vulnerabilities (Oliver-Smith, 1996; Olson & Gawronski, 2003). Laying bare past political processes, disasters create opportunities to critically review established ways of thinking, the social contract, and the competencies of elected leaders (Olson & Gawronski, 2010; Pelling, 2013). Disasters create a "blank slate" or a

"reset button" for building infrastructures and institutions in new and better ways (Agrawal, 2011).

Post-impact, disasters bring to bear attention and resources to political issues and proposals that under "normal" circumstances would be unable to garner the political and economic support. Therefore, disasters provide leverage and finance for alternative changes, which are "unpalatable" in normal times (Lakoff, 2010). Together, these factors create a window of opportunity, which remains open for a short period of time, and then closes due to a variety of factors.[7] One factor relates to the people and organizations that leverage opportunities. In this study, we describe the total of domestic, local and external actors pertaining to government, private sector, and civil society entities, who arrive at a disaster-affected place to support disaster response and recovery as the "disaster arena." Depending on the governance arrangements characterizing the disaster arena, the very conditions that create opportunities, as described above, can backfire and make sustainability transitions even harder or impossible (Fan, 2013).

Transitioning from response to disaster recovery connecting recovery efforts with broader development aims remains a challenge (Christoplos & Rodríguez, 2010). Although disaster governance is nested within and shaped by overarching risk-inducing forces such as globalization, world-system dynamics, international markets, and socio-demographic trends, disaster governance lacks integration with these mechanisms

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[7] Scholars identified different periods during which the window remains open. For instance, Lam (2012) found that the first 6 to 9 months after disaster provide a window of opportunity to advance recovery of small businesses. Paul & Che (2011) suggest that the policy window for housing remains open for about 18 months. Others investigated the factors that lead to the closing (c.f., Solecki & Michaels, 1994; Kingdon, 1995; Olson & Gawronski, 2010. Lastly, Christoplos (2006) stipulates that development organizations are unprepared to seize these initial windows of opportunity, yet, they might be more effective in later stages of a disaster recovery.

(Tierney, 2012). Furthermore, as records were destroyed, local leaders killed and incapacitated, international (aid) organizations step in, often without being asked, to address these perceived governance gaps and insufficiencies of host organizations; sidestepping accountability and failing to connect their programs with local and national development programs (Berke, 1995). Moreover, Ingram et al (2006) indicate that the pressure to urgently address complex, difficult decisions that required addressing short-term needs while accounting for long-term development goals can result in policies that undermine sustainable development. Despite these challenges studies reassure that opportunities exist for communities and municipalities to introduce sustainability objectives into their reconstruction and recovery efforts, even when they missed the initial window of opportunity (Institute of Medicine, 2015; Berke & Campanella, 2006)

Some scholars argue that leveraging disasters for positive change is possible as disaster brings the best out of people in the early phases post-impact (Fritz, 1996): The shared experience of having survived hostile and traumatic events makes people more "friendly, sympathetic, and helpful than in normal times," which facilitates bonding among people who would otherwise not have met due to their social situations. Such solidarity effectively enables them to build a (temporary) paradise in the hell of disaster (Solnit, 2009) and fulfill a utopian image. Fritz (1996, p.57) argues that people "see the opportunity for realizing certain wishes that remained latent and unfulfilled under the old system. They see new roles that they can create for themselves. They see the possibility of wiping out old inequities and injustices. The opportunity for achieving these changes in the culture lends a positive aspect to disasters not normally present in other types of crisis." There is now emerging evidence how the disastrous experience can trigger a

"positive transformation" within individuals; i.e., the ability to transform experienced trauma into agency (Masten & Obradovic, 2008). This internal shift unleashes these actors' human potential to commit and care in order to effect change for a better life; indicating how agency can manifest in individuals' interactions with systems (O'Brien & Sygna, 2013). While attention to the diversity of actor groups and the agency of actors in disaster studies is growing, research on the actors and agency necessary for sustainability-oriented disaster recovery research is only emerging. Mostly two groups are identified, with each group comprising of individuals and organizations from diverse sectors: those that plan for and carry out disaster recovery (group A) and those that plan for and build sustainable communities in normal times (group B). Currently, these groups too often work in isolation (Institute of Medicine, 2015).

More general conditions conducive to leveraging change towards sustainability in disaster contexts include a strong association with place, trust in leadership that accepts proposed changes and demonstrates political capacity to implement structural change and strategic investments as well as to cut incentives that maintain current systems (Pelling, 2013). Sustaining introduced changes requires translating them into institutions, including technologies, discourses, laws, and the social contract (Pelling & Dill, 2010).

Ultimately, the conditions and processes that enable social change in disaster contexts are interrelated. Sustainable disaster recovery is most effective if it can draw on sustainability visions and disaster recovery and mitigation plans developed pre-disaster and when sustainable disaster recovery is linked to sustainable development in normal times (Berke et al., 1993; Smith & Wenger, 2007). In the absence of alternative visions, the desire to move fast and to rebuild quickly to return things to "normal" can override

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the efforts aiming to seize the opportunities for change created by the disaster.[8] In the words of Milton Friedman: "Only a crisis - actual or perceived - produces real change. When that crisis occurs, the actions that are taken depend on the ideas that are lying around."

Sustainability transition studies and their conceptualization of change. Independent of disaster research, research in sustainability science has put forth a variety of conceptual frameworks to understand how societies are able to make intentional transitions to advance sustainable development pathways. These frameworks are offered from different disciplines (e.g., resilience thinking, transition management, intervention research), and applied to topics such as climate change or global environmental change adaptation (e.g., Park et al., 2012; Sarewitz et al., 2012), fisheries (e.g., Gelcich et al. 2010), and financial systems (e.g., Loorbach & Huffenreuther, 2013). Despite their different origins, the frameworks conceive of transitions in similar ways (c.f., Fischer & Newig, 2016; Smith & Stirling, 2010).

They conceive of intentional change processes as one among various pathways within a complex adaptive system extending across local, regime, and landscape levels and over decades. The pathway of change occurs in consecutive phases, which some capture as "preparing the transition," "navigating the transition" and "building resilience for the new regime" (Olsson et al., 2006). In this conceptualization, the window of

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[8] Tierney (2012, p. 348) notes that "[w]orldwide, except in unusual cases, societies and communities typically place more emphasis on immediate disaster response activities than on pre-event mitigation and preparedness or long- term recovery efforts. This is especially true in poorer countries that lack the resources to launch comprehensive disaster risk-reduction efforts, but it is also true even in better-off nations."

opportunity, triggered by crisis (or some other external shock), opens the door to "navigating the transition." Here, crisis results as systems become overly rigid, and the release of this rigidity can lead to a systemic crisis on multiple levels and scales, triggering a reorganization and a shift that potentially results in a new regime. The underlying concept of this process is the adaptive cycle. Interactive dynamics of nested sets of these adaptive cycles are captured in the idea of "Panarchy" (Folke et al., 2010). The idea of Panarchy helps explain how pre-disaster conditions cast their shadow long into the future and hence shape deliberate change processes. As some variables move fast, making changes visibly quickly, others move slower and enact change in more indirect ways. And while these change processes are located at different scales, they influence and interact with each other (Folke et al., 2010).

Scholars remind us that the agency of change is held within individuals and networks and thus depends on individuals mobilizing in collective action to affect change (Pelling & Manuel Navarrete, 2011; Fischer & Newig, 2016). For example, some argue that "shadow-networks" of informal social organizations that share values, knowledge and resources prior to crisis can emerge as instrumental actors post-crisis (Olsson et al., 2006). Others find that institutional entrepreneurs also emerge post-disaster, mobilizing collective action following crisis (Westley et al., 2013). "Transition arenas" have been identified as spaces and processes of innovation, where individuals from diverse domains connect in normal or crisis times and collectively work towards a shared sustainability vision or transition agenda (Loorbach, 2010). The groups comprise of individuals, who work in different sectors of society, including government, private, and third-sectors (including non-governmental, not-for-profit, and civil society organizations) and enjoy

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respect and some authority in their networks. These individuals self-identify as change agents in diverse roles including, e.g., as technical expert, networker, or opinion leader (Loorbach, 2010). A variety of attributes have been identified that characterize them, including e.g., abilities to engage in big picture sustainability visions, think together, and invest time and energy into the process (Loorbach, 2010, Westley et al., 2013).

As the intentional change processes advanced by these groups occur within larger complex adaptive systems, the "outcomes of actions are unknowable, the system unsteerable and the effects of deliberate intervention inherently unpredictable" (Shove & Walker, 2007, p.8). Hence, these groups direct change not by commandeering and steering followers, but by reflexively mobilizing and organizing energy and agency held within other groups in order to move change in support of the transition agenda (Westley et al., 2013; Loorbach & Huffenreuther, 2013). The decision-making processes move along pathways marked by decision-points to adaptively reassess and redirect in light of the conditions posed by the decision-space at the time (Wise et al., 2014).

Mobilizing for change therefore requires spaces and processes that enable reflection and social learning and the ability to adjust intentional change processes in response to changing contexts. Mechanisms for social learning include real-world experiments to test and learn about proposed shifts on small scales (Gelcich et al., 2010; Tschakert & Dietrich, 2010) as well as spaces, such as conferences and festivals, where groups proposing alternative visions and working through informal processes can be in dialogue with policy makers operating within formal processes (Pahl-Wostl et al., 2013). Offering one way of integrating these various elements of sustainability transitions into a analytical and evaluative framework, Forrest & Wiek (2014) created a model that allows

reconstructing pathways of bottom-up and community-driven sustainability transitions, accounting for actors, their practices, and the role of context in shaping these actions.

These approaches each have some shortcomings, but collectively could work synergistically. For instance, the approaches grounded in resilience thinking are mostly concerned with system dynamics to ensure that crisis and ensuing reorganization occur "gracefully" and stakeholder input is sought to optimize desired system dynamics. Sustainability transitions, in contrast, are focused on eliciting stakeholder input to identify desired future scenarios and pathways to pursue these outcomes (Redman, 2013). Both approaches have been critiqued for failing to sufficiently account for underlying politics, power structures, conflicts, and inequality, which differently affect people's abilities and constraints to develop agency and participate in transitions (Cote & Nightingale, 2011; Shove & Walker, 2010).

Disaster studies give a distinct and rich description of the immensely complex and political contexts related to the disaster and the role of conditions and processes pre-ceding and following disasters. Nevertheless, the focus tends to still be on disaster management, as indicated in the UNISDR (2015) most recent call for shifting focus from managing disasters to managing risks to disasters while accounting for sustainable development. Meanwhile, sustainability transition approaches are focused on achieving normative sustainability related goals; yet, many transition studies have focused on processes occurring in normal times or in the context of crisis (as opposed to disaster). Thus, this body of work is less cognizant of the messy political and social reality of disaster, where proposed steps and mechanisms may not be employed as in normal times. Areas of overlap include the focus on actor groups and relations among them (social

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capital) as well as on individual and collective agency as an essential element to advance change towards sustainability in disaster times.

Considering the complementary and overlapping focus of these two big bodies of work combining the insights from both areas into a unifying framework makes a contribution to understanding how opportunities created by disaster can be leveraged for change towards sustainability. Such a framework must account for concurrent change in multiple dimensions of human activity, originating within distinct elements of civil society, private sector as well as within formal government agencies. It must also make explicit the normative criteria by which change is evaluated; these criteria will need to be independent of any one actors' perspective.

Framework To Analyze And Appraise Sustainability Transitions Originating In Disaster Contexts

To synthesize the above insights from both domains into a common framework, I combine the conceptualizations of disaster and change with conceptualizations of change towards sustainability. Overlaying the two models is possible, as both are structured into three major phases (see figure 1): at the center are the initial change actions emerging during the disaster response phase; these are shaped by pre-disaster conditions and followed by efforts to leverage reconstruction and recovery to implement sustainability changes over time, using resources and inputs. Hence, figure 1 schematically illustrates how disasters create the opportunity to choose a development pathway towards a sustainability vision or towards going back to normal. Although the figure distinguishes

between two pathways, the reality is that there is a multitude of pathways, often

competing with and influencing each other.
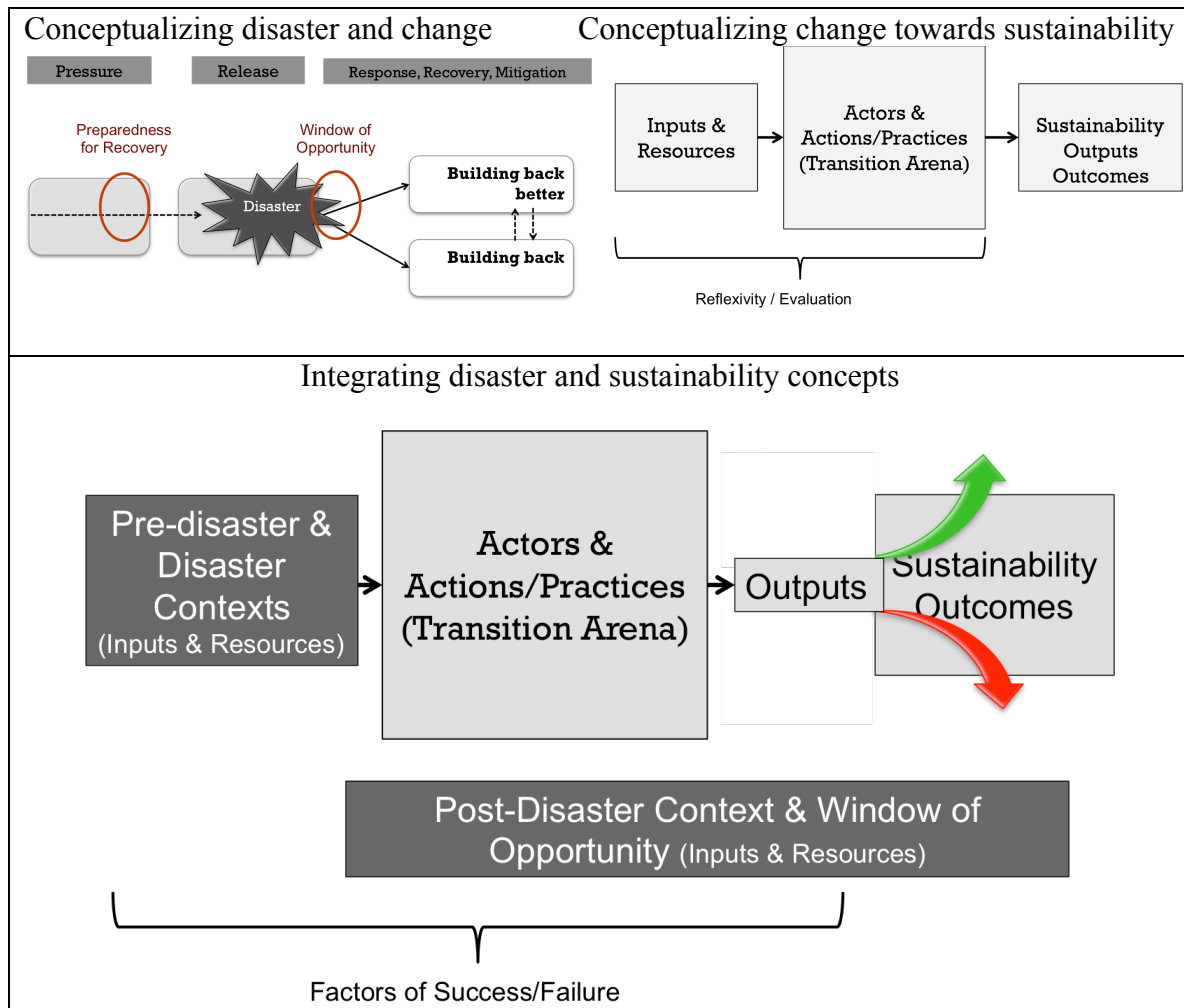
Figure 1. Basic structure to understand disaster and opportunities to choose pathways.

Figure 1 combines the conceptualization of disaster and change with the

conceptualization of change towards sustainability in order to create an integrated

framework that allows reconstructing pathways of change towards sustainability in

disaster contexts.

Figure 2 unpacks the simplified illustration of figure 1 by presenting for each phase of the process the main categories. The framework accounts for essential "pre-crisis" conditions and resources that enhance the probability of sustainability transitions (Inputs & Resources). It brings attention to the disaster itself as well as to the disaster arena and disaster transition arena respectively, which—depending on their social relations, attributes of governance, and access to resource are able to recognize and seize windows of opportunity for change towards sustainability. Post-impact, the framework highlights the elements necessary for actors to leverage the disaster recovery to implement change towards sustainability. The "outputs" category captures the tangible changes manifest on the ground. Actors appraise these changes and the process leading to these changes in terms of whether they represent progress towards sustainability or not. The results of the sustainability appraisal are captured in the "outcomes" category. Changes that represent progress towards sustainability are those, whose outcomes are available to broad populations (not only disaster-affected populations) and over the longer term (not only during the recovery periods).
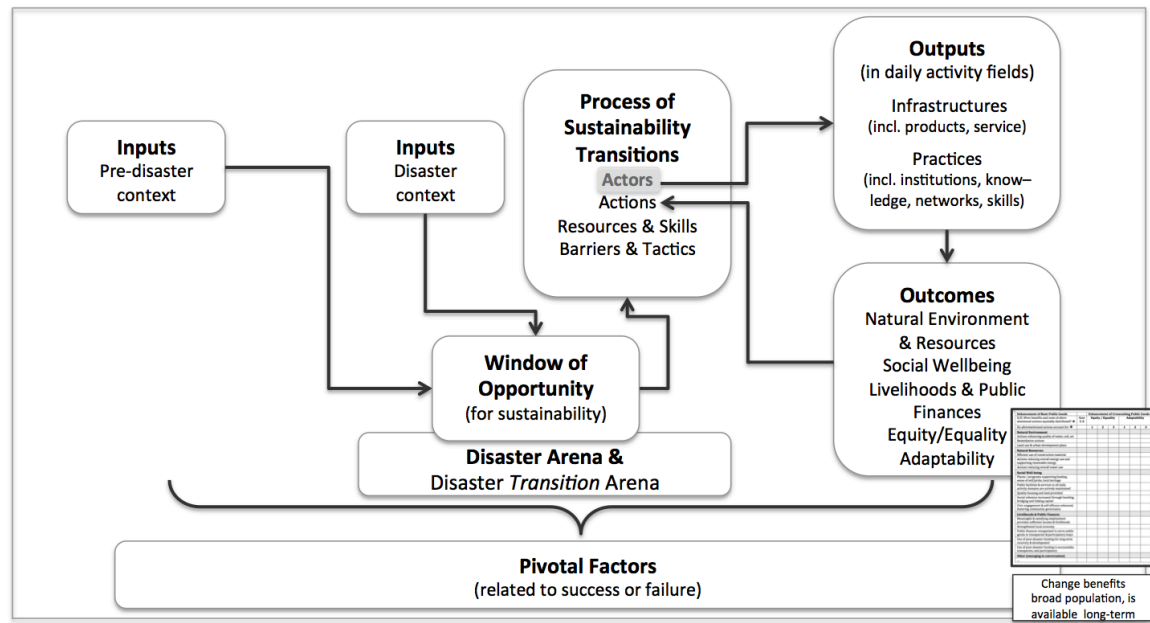
Figure 2. Analytical categories to reconstruct pathways of change towards sustainability.

Following the perspective of actors, figure 2 depicts the analytical categories and their elements in order to reconstruct the process of the actor's sustainability initiatives and appraise their contribution towards sustainability.

To appraise the direction of a disaster recovery pathway, we provide a series of analytical questions (black-framed box at the bottom right of figure 2), borrowing from Forrest & Wiek (2014). The outputs and sustainability outcomes provide the basis to reconstruct the processes that led to them, considering pre-disaster, disaster and post-disaster contexts.

Outputs: what changes occurred? Outputs refer to the actual real world changes, which may be perceived as positive or negative. Outputs are identified in daily activity fields, including housing, being mobile, recreating, working, eating, educating, worshipping, shopping, caring, engaging, and communicating (Kahneman et al., 2004). The daily activity fields acknowledge rebuilding sustainable communities, which should

be "holistic, integrated and balanced" as disasters impact people's experiences in all of daily life (Awotona & Donlan; 2008). During their daily activities, people draw on infrastructures (e.g., electricity, drinking water, streets) and formal and informal rules (e.g., prices, water saving behaviors). Thus, a focus on daily activity fields also entails the infrastructures and institutions associated with each field (Forrest & Wiek; 2014). While infrastructures and institutions influence people's practices, people's practices simultaneously shape these infrastructures and institutions—confirming or altering them (Giddens, 1984).[9]

Process: Who was involved in seizing opportunities? How was it done? What resources and skills were used? What barriers were encountered and how were they overcome? Process includes a series of sub categories, starting with identifying the actors who were able to see and seize the window of opportunity. These actors and the diverse sustainability initiatives that actors promote, may find each other in the midst of the disaster arena. They may form a collective body, the disaster transition arena, aiming to coordinate sustainability initiatives across diverse daily activity fields (e.g., housing, mobility, health), scales (e.g., connecting local, national, and international actors), and broad sustainability goals. These actors can be further described by their purposes, actions, resources and skills employed, as well as their tactics used to overcome barriers. Some may be groups that existed pre-disaster; others emerged in response to the disaster.

Context: what inputs from the pre-disaster and disaster context influenced the process and actors' decisions and how? Inputs (pre-disaster context) refer to the

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[9] Infrastructures include the built environment as well as ecosystem within the built environment that perform similar functions like engineered systems (e.g., mitigating floods, purifying water).

historically grown, structural layers of people's vulnerability described as unsafe conditions, dynamic pressures, and root causes, which unravel in the event of a hazard hitting a place (Wisner, et al., 2004). Inputs also entail the capacities, capitals, assets, and resources that exist in a place and are held within communities, households, and individuals. Inputs (disaster context) include the disaster arena that is the suite of incoming external and internal actors arriving at a disaster affected place with their agendas, resources, and capacities to engage in response and recovery planning. Both groups entail newly emerging and established organizations. Inputs also include the impacts created by the hazard, the resulting formal and informal changes, as well as the influences stemming from other concurring processes (e.g., domestic policies, global supply chains, global environmental change).

Outcomes: what was accomplished in terms of sustainability? what was the impact on the community? Outcomes result from conducting a sustainability appraisal of the outputs and the processes related to generating these outputs. The sustainability appraisal draws on a comprehensive set of sustainability principles, which Gibson (2006) synthesized across the literature of sustainability assessments.[10]

We simplified these principles into a matrix of three main principles, including integrity of the natural environment and natural resources, enhancing social well-being, and ensuring livelihoods and public finances. For activities in each principle we also ask whether they consider intra- and inter-generational equity concerns as well as the ability to adapt long-term and in response to surprises (see Table 1). We consider these as cross-

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[10] We choose Gibson (2006) as these sustainability principles are the synthesis of a comprehensive review, including studies and meta-studies on environmental and sustainability assessments over the past decades.

cutting principles as considerations about equity and adaptability should not be add-ons on a list, but integral to any development effort.

Table 1

Overview Of The Principles For The Sustainability Appraisal

Basic sustainability principles	Cross-cutting principles	
Integrity of the natural environment and resources	Equity and Equality	Ability to adapt long-term
Enhancing social wellbeing		
Ensuring livelihoods and public finances		

Each principle is specified for the disaster context, drawing on criteria for sustainable disaster recovery where available (e.g., Berke, 1995; Monday, 2002; Berke & Campanella, 2006; Lizarralde et al. 2012). The criteria are operationalized through a set of qualitative appraisal questions, designed to elicit information about what type of development was pursued with the actions during the recovery phase and afterwards. Rather than aiming for a comprehensive sustainability appraisal of a community or a region (how sustainable a community or region is), the purpose of the questions is to determine the direction of a set of change process (e.g., are projects and actions moving towards sustainability?). Furthermore, the appraisal is not a comprehensive sustainability assessment, which would operationalize goals and indicators in measurable ways. The responses to these questions are compiled into the above matrix, which enables an appraisal of how far the actions implemented in relation to each principle account for equity as well as adaptability (see appendix).

Pivotal factors: what were the critical factors supporting success or leading to failure of the sustainability initiatives? Pivotal factors, revealing critical factors for success or failure, can be identified when reflecting on the interplay among all of the above categories, i.e., all along the change processes engendered by the sustainability initiatives.

The purpose of the framework is to enable an exploration of the transition's ability to enfold its potential, e.g. by revealing obstacles or drivers related to enhancing the transition. Therefore, we propose using a "distance to target" approach using sustainability visions and their goals as target (Gibson, 2006; Berke 2002) instead of appraising progress from a pre-disaster baseline. The framework also emphasizes that sustainability transitions, like post-disaster recovery, are long-term processes, extending over several decades (Kates et al., 2006; Loorbach, 2010). Thus, measuring transitions in terms of success or failure in their early years may be counterproductive as many initiatives are still "transitions in the making". Instead of making an untimely judgment call on their effectiveness, they should be viewed as a "microcosms of future reconfigured systems" (Turnheim et al., 2015).

Findings From Applying Diverse Sustainability Cases to the Framework

In order to test the framework and its ability to document, analyze and compare case studies, we apply the framework to select cases that purportedly attempted to leverage opportunities created by disaster for change towards sustainability or towards

specific aspects of sustainability.[11] We describe the cases briefly in Table 2 and then

present the findings in summative ways in the remainder of this section. Clearly, the set

of case studies used here to test the framework is small and there might be other case

studies. However, identifying case studies that purportedly attempted to pursue change

towards sustainability in disaster context proved challenging as disaster and development

studies employ distinct foci on the analysis of change in disasters (recovery vs.

development) and inconsistent terminology. Despite an increase in literature on

individual recovery cases, there are few comparative studies and even fewer studies that

synthesize findings (Kim & Olshansky, 2015). By inference this also mirrors the situation

of advancing sustainability in disaster, a sub-group of disaster recovery studies.

Therefore, the presented results are not conclusive evidence; they are propositions, which

can be further tested and validated by adding additional case studies in the future.

Table 2

Overview Of Select Cases That Seized Opportunities For Change Towards Sustainability

Greensburg, KS. Greensburg is a small rural town in the USA (~ 1200 people), which was almost completely destroyed by a EF 5-strong tornado in 2007. Greensburg leveraged the disaster to rebuild itself as "Greensburg-Greentown, the greenest town in rural America." Greensburg indicates that creating a safe and participatory space for creativity, exploration, experimentation and innovation is possible in a disaster context and can be leveraged to shape a town's sustainability development (Rozdilsky, 2012; Bromberg, 2009; Swearingen-White, 2011).

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[11] These case studies result from a literature review in 2014/2016 using Web of Science and combinations of the following search keys, which should be included in the title, abstract, or keywords: sustainability / sustainable development; opportunity / window of opportunity; disaster; recovery / reconstruction. Articles were selected after reviewing titles and abstracts and performing a keyword search in the main body. Additional articles were added, because they were mentioned the retrieved articles. For instance, the case studies of Soldiers Grove, WI, Kinston, NC, and Valmeyer, Il were referenced in articles on Greensburg and in Schwab et al. 2014; they did not emerge through the Web of Science search. Similarly, the work from Alaniz (2012) did not show up in the search. It was added after I learned about it at a meeting.

Soldiers Grove (WI, 1978), Kinston (NC, 1996, 1999) and Valmeyer (Il, 1993) are small rural towns in the USA (600-900 people), with histories of recurring floods and hurricanes ravaging their regions. The approaches taken by these towns have been influential in informing the idea of rebuilding sustainably (Schwab et al., 2014; FEMA 2011). After surviving extreme weather events, the towns decided to relocate and do so in a sustainable way in order to survive in the long-term. Their strategy combined renewable energy production, disaster risk mitigation, and sustainable relocation. They framed their efforts to seize the WOO as *VISIONS: Valmeyer Integrating Sustainably Into Our New Setting* (Watson, 1996; Knobloch, 2006) or *Soldiers Grove: The Little Town That Could* (Becker, 1994).

L'Alquila. The Abruzzi Earthquake (MG 6.3) struck the town of L'Aquila and its surrounding municipalities in 2009. While the initially state-led recover process was critiqued for many reasons, some communities successfully seized the WOO in their aspiration to become a resilient eco-village (Fois & Forino, 2014) or to substitute fossil fuels based energy systems through renewable energy systems—temporarily during relief phase and permanently as part of reconstruction (Micangeli et al, 2013).

Wenchuan province. The Wenchuan EQ (MG 7.9) devastated the Province of Wenchuan, China on 12 May 2008 and killed 69,197 people. The Chinese Government proclaimed to seize the WOO for sustainable development (Dong, 2012) and in particular to support more equitable peri-urban development, accounting for the needs of rural areas (Abramson & Qi, 2011). Yet, it abandoned its efforts quickly, responding to pressures from the tourism industry and trying to finish reconstruction before the impending global financial crisis rippled through. Nevertheless, rural villages continued to pursue opportunities for change towards sustainability. They tried to reassert their rural identity despite insatiable peri-urban growth and to establish enterprises in agro-ecology and ecotourism despite the standardizing efforts of the national tourism industry.

Honduras. Hurricane Mitch (1998) devastated the impoverished indigenous Tawahaka community in Krausirpi, Honduras. Women and young community members mobilized post disaster and facilitated processes that resulted in changed land-tenure systems, granting previously marginalized community members better access to land, and improved forest management that reactivated the traditional ecological knowledge informing disaster mitigation and diversified livelihoods (McSweeney & Coomes, 2011; Agrawal, 2011). Another community, Divina, Providencia and Ciudad España, Honduras, successfully relocated to a new area with the help of strong NGOs. In contrast to other relocated communities, Divina developed shared norms that resulted in healthier community structures and reduced social inequities (Alaniz, 2012). The Stockholm Declaration, a mutual agreement between international donors and the disaster-affected governments, led to some positive developments in Honduras and Nicaragua (Fruehling, 2002).

International Mental Health Care. Armed conflicts and natural disasters ravaged communities in low and middle-income countries creating opportunities to address major gaps in community-based mental health care. The 10 cases reviewed by Epping-Jordan et al., (2015) include Afghanistan, Burundi, Indonesia (Aceh Province), Iraq, Jordan, Kosovo, occupied Palestinian territory, Somalia, Sri Lanka, and Timor-Leste. Across these cases, 10 lessons emerged how to seize the disaster as opportunity to create a *mental health care system* that adopts a long-term perspective from the outset, and focuses on system-wide reform addressing pre-existing mental and new-onset disorders.[12]

Pivotal factors.

Context: what inputs from the pre-disaster and disaster context influenced the process and actors' decisions and how? The application of the framework to the cases highlights some pre-disaster activities that became important accelerators for seizing the window of opportunity for change towards sustainability, because they spread ideas about sustainability and built latent capacities for pursuing it. For example, in the Greensburg case, individuals and organizations had engaged in (unsuccessful) efforts to revitalize their declining rural town; this experience and the social relationships that it had involved was reactivated to catalyze post-disaster efforts for urban renewal. In Krausirpi, Honduras, residents who participated in natural resource management workshops were able to draw on that learning and experience, despite the lack of prospects in the pre-disaster context to apply their learning in the pursuit of desired change. Other disaster inputs highlighted across the cases included the availability of large sums of funding, which would otherwise not be attainable; national and international professional

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[12] The proposed framework considers changes occurring in various daily activity fields, including caring, which is part of the social dimension of sustainability contributing to social wellbeing. This is an example where post-disaster opportunities were leveraged for select aspects of sustainability, with health being foundational for sustainability.

expertise, support and attention; collectively owned leadership involving recognized community leaders and local officials working with state and national government entities and/or international NGOs; and a supportive and sustained role of the media. In the 10 cases that successfully developed a mental health care system, the media amplified the public's empathy, making mental health a political priority, which caused decision-makers to allocate resources in unprecedented ways to a previously neglected area.

Process: Who was involved in seizing opportunities? How was it done? What resources and skills were used? What barriers were encountered and how were they overcome? In each of the cases, the practices that actors, in particular residents, chose were not the typical responses, such as leaving the disaster affected region or succumbing to following the formal disaster recovery process; instead they chose to start sustainability initiatives or join to support them. The cases show how sustainability initiatives brought diverse people together who saw sustainability as opportunity to build a future—not as a "nice-to-have add-on" to disaster recovery. The American case studies indicate the role of a well aligned disaster transition arena comprising of residents, some of them representing formal bodies such as village boards or citizen committees, municipal leaders, often including the mayor, city manager, city staff from both disaster management and regular departments, representatives of civil-society organizations and business owner associations; as well as officials working in state and national agencies. For the Honduras cases (Krausirpi, Divina), authors point to the ability of state government and international donor organizations respectively to understand when to engage and when to step back to support the community's process and its success. Similarly, the ability to assert and employ the expertise held by local and national

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professionals by involving external actors and national government in their support proved critical for the mental health case studies. Thus, a disaster transition arena self-organized, operating across sectors and scales. Two special features emerge within these disaster transition arenas. One is the role of the liaison, specifically a sustainability liaison. Greensburg pioneered the sustainability liaison, which was the go-to-entity for everyone—residents, contractors, or officials—related to sustainability for disaster recovery and for normal development processes. In the Tawahaka community in Krausirpi, Honduras, the young community members, those who attended the pre-disaster capacity building workshops, informally took on the role to be the liaison, engaging a diffuse decision-making process around reforming land tenure rules. The role of the liaison facilitates connections, coordination, and communication among diverse, sometimes antagonistic, groups. The second feature is the collaboration between the disaster transition arena and research/educational entities. Members of the disaster transition arena approached universities seeking support in developing their own knowledge about their sustainability aspirations and in evaluating studies and proposals prepared by donors, federal, or consulting groups. In Wenchuan Province, China, rural villages worked with the University's social work departments and NGOs to develop the villages' local eco-tourism and agro-ecology programs, which allowed villagers to pursue local recovery goals in parallel to the government-led process, which favored reconstruction over recovery. The American case studies and some of the disaster-affected municipalities in L'Aquila, It, self-identified as living learning laboratories for sustainability technologies. They partnered with federal departments, such as the National Center for Appropriate Technology and with university professors and students to test

renewable energy systems or green building features. Some of these pilot projects contributed to now well-established innovations, such as the USGBC's green building certification program.

The disaster transition arenas framed the window of opportunity in different ways. For rural areas in the USA, having experienced steady economic decline, the idea of sustainability provided the opportunity considering the lack of other viable options for a long-term future. For instance, the town of Valmeyer, Il initially seized the WOO not because it was pulled by a compelling sustainability vision, rather because residents saw no alternatives. Taking advantage of the new US hazard mitigation program was the only viable option, which they later successfully transformed into a sustainability vision. A similar example is Greensburg. While the Governor, mayor, and city manager immediately proclaimed the shared vision of Greensburg becoming "the greenest town in rural America", residents opposed this idea, until they realized that sustainability was their opportunity for survival. In Pescomaggiore, Abruzzi, It, people had envisioned building an eco-village prior to the disaster. The disaster allowed accelerating this process, as actors were strategic about obtaining temporary exemptions for their plans during the relief phase and turning them into permanent permits for development. In Krausirpi, the WOO was seized to systematically reorganize land tenure arrangements around equity, which improved livelihoods in general and increased equity for previously disadvantaged groups. In the Wenchuan case rural villages seized opportunities to redefine their local identifies, trying to defy the spreading and standardizing processes advanced by the national tourism industry and peri-urban growth.

In addition to these efforts by disaster-affected groups, external actors started to see how their support of those sustainability process could provide opportunities for themselves; helping to leverage their own sustainability agenda. For instance in the American case studies, in particular in Greensburg, national organizations (e.g., AIA, USGBC, and NREL), corporations (e.g., wind energy, film producers), the University of Kansas, community groups and individuals came, because they saw Greensburg as a place that allowed them to pilot their own sustainability endeavors. While they contributed to the sustainability innovation processes in Greensburg, these external actors increased their knowledge and networks which allowed them to improve and scale up their sustainability products for normal times (e.g., new USGBC certification program). Also, the external actors' reputation benefitted from the media attention given to Greensburg, and the external actors used their own media relations to spread the word about Greensburg in new circles. This symbiotic relationship between a disaster-affected population seeking to leverage sustainability during disaster times and non-disaster affected groups seeking to promote sustainability during normal times seemed to be most pronounced in Greensburg. Yet, it happened also in Pescomaggiore, Abruzzi, It, where people arrived to live there, as well as in the mental health case studies, where organizations decided to join and support these efforts in order to advance one of their main goals: to reform the national mental health system.

Among the various practices employed, learning and communicating stood out. Learning was self-directed, experiential, and social. Actors learned about sustainable development and creative problem solving (e.g., around civic engagement, anticipating barriers, identifying past mistakes, acquiring and utilizing funds) as they wanted to

increase their decision-making competence and to better understand how their sustainability vision can translate into actions and projects. For instance, in Wenchuan and Krausirpi, people recalled their local ecological knowledge and innovated on it to change their agricultural and forestry activities. City-to-City learning was found effective: Mianzhu City (Wenchuan, China) invited the city of Greensburg to enter a multi-year partnership in order to support Mianzhu City's earthquake recovery, and disaster-stricken cities were paired with other Chinese cities to support learning for recovery. Although the intended outcomes failed to manifest due to a variety of reasons, the model is considered valuable and to be improved. The American case studies set up a learning infrastructure. This ranged from a Sustainable Resource Office with personal support, to technical trainings for contractors helping them to learn how to comply with newly submitted regulations, to educational, hands-on workshops and toolkits for the public to learn about sustainability, and a general open-door-policy for everyone interested in learning about the sustainability process. Communication and sharing information was essential to keep awareness high over time and to be able to walk the fine line between adhering to the rule-of-law and challenging it. For instance, the Tawahaka community succeeded in instituting the new land-tenure system and other reforms by using mostly its traditional institutions of bilateral, diffuse and calm conversations, without any central decision-making body or "village-meetings" commonly coordinated through government or international NGOs during disaster recovery. In contrast, sustained and broad citizen engagement failed in Wenchuan Province due to lack of information and lack of trust in information. In the American case studies, ongoing communication and the ability to learn instilled confidence in the

process in residents and that it is not just "opportunistic outsiders" coming in and imposing new ways of doing things. Formal and informal, ongoing, open, and accessible ways of communication proved to be essential to keep actor groups engaged in the process, to address discomfort early, and attract new groups to support the process. Related the latter, Greensburg is one example that proactively sought ways to sustain diverse media coverage over time.

The studies mentioned how they seized the opportunity. Yet, they were less explicit about the length of the window being open and the factors that closed it as well as what monitoring and evaluation activities were in place. However, certain barriers became clear. Some of these barriers are well known in disaster recovery in general, such as in Valmeyer, Il, where actors perceived the recovery processes as advancing too slow and lamented the lack of sufficient funding, which necessitated ongoing fundraising for sustainability initiatives. In Greensburg the progress in sustainable housing was overshadowed by the lack of progress in attracting sustainable businesses and jobs as well as in providing affordable housing, which hindered the return of previous residents or arrival of new residents. Barriers specific to leveraging sustainability initiatives during disasters pertained to the lack of apparent or immediately available sustainable alternatives. While they drove learning and innovation in the American case studies (which benefited from the support of national laboratories), the lack of visibility of these "projects in the pipeline" caused people to drop out of some sustainability initiatives in the L'Aquila region. In Wenchuan, the government decided to reduce the already short timeframe for the government-led reconstruction from three to two years; to let the tourism industry become the strongest stakeholder in the process; and to abandon the idea

of peri-urban development. These decisions created a conflict that fuelled the informal transition processes on the local level in rural villages, which in turn increased pressure for national change, and created a duality of persisting path-dependence and transformative change on both, the local and national level.

Outputs: What changes occurred? Actor groups created outputs in more than one daily activity field; many of these outputs were first-of-its-kind innovations. For instance, the American case studies established sustainability inventories and submitted regulatory changes, including novel federal and state laws on renewable energy and natural resource conservations (Soldiers Grove, Kinston) and Greensburg received international awards for its sustainability masterplan that was derived from a publicly endorsed sustainability vision. In Krausirpi and Wenchuan province, new rights were instituted that benefitted previously disadvantaged groups such as the redefined land tenure-system in Krausirpi increasing land-ownership of previously land-poor households and the household registry for peasants in Wenchuan. Also new networks were established including a novel inter-agency sustainability-working group (American case studies), city-to-city partnerships (Greensburg-Wenchuan), community-university relationships (various), and healthier community structures (Divina, Honduras). These networks also facilitated an increase in capacities and knowledge as well as development of new products and services, such as municipal educational offerings, commercial consulting, and technical support (American case studies), niche-markets for agro-ecology and eco-tourism (Krausirpi, Wenchuan), which led to slowing down conversation of primary forest in Krausirpi and allowed using the forests' ecosystem services also for hazard mitigation.

***Outcomes: What was accomplished in terms of sustainability? What was the
impact on the community?*** The rough sustainability appraisal across the case studies
suggests that various sustainability principles were pursued, albeit not every principle
was equally addressed in every case study. As for Natural Environment and Resources:
natural capital, like soil, air, and water quality, was enhanced when it benefitted
livelihoods as well as hazard mitigation measures (such as agro-ecology efforts in
Krausirpi and Wenchuan; or the first US conservation zone established in Kingston). In
contrast, remediation actions on non-disaster related contaminated natural resources were
not reported. Efficient use of material is reported in the eco-village and towns
participating in the renewable energy pilots in L'Aquila region as well as in the American
case studies; the remoteness of some of these areas however made these considerations
difficult.

As for Social Well-Being: A strong association with place and the role of place
making was an evident driver for sustainability transitions across all case studies and
expressed itself through the slogans defining the American towns, or through post
disaster reactivation of cultural heritage and indigenous and traditional ecological
knowledge in Wenchuan and Krausirpi. Similarly, social cohesion and civic engagement
capacities were increased (or latent capacities brought to light) due to the efforts
emanating from the disaster transition arena. In fact, the restructuring of social relations
in healthier ways was seen as one of the reasons why the relocation succeeded for the
community in Divina, Honduras. In terms of Public Facilities and Services created or
maintained, the mental health case studies highlight important progress in establishing
public mental health systems; the Krausirpi case stipulates an improved understanding on

behalf of state and international NGOs of local needs related to public services, and the American case studies invested in creating good public spaces. In contrast high quality, affordable, and sustainable housing remains a challenge for service provision across most cases. As for Livelihoods and Public Finances: creating meaningful and sufficient employment as well as strengthening a local economy was accomplished only in few cases, for instance in Krausirpi people were able to diversify their sources of income. In other remote and rural places, like Greensburg and Wenchuan, attracting businesses, in particular sustainable businesses, remains a challenge. The studies indicate that post-disaster funding was made available for the relief phase as well as for long-term recovery and the disaster transition arenas played a role in acquiring and allocating funds. Nevertheless, securing funding for ongoing recovery remained a continuous effort. To appraise the extent to which public finances where reorganized in order to serve the public good would have required more research, which we were unable to undertake at this stage.

The second dimension of the sustainability appraisal explores to what extent cross-cutting sustainability principles, including equity/equality and adaptability were enhanced in each of the other three sustainability principles. As for adaptability, the work of the disaster transition arena was guided by sustainability visions, which were themselves informed by a long-term perspective and clear long-term sustainability goals. The American case studies made the connection between sustainability and disaster mitigation and risk reduction explicit, by combining relocation (out of the floodplains), use of renewable energy, and hazard mitigation priorities. As for appraising the equity/equality aspects, the challenge is to differentiate between the intent to equitably

distribute costs and benefits among social groups, including current and future generations as well as neighboring or otherwise functionally connected communities and the actual outcomes of that intention.

Discussion

Application of the framework to diverse cases allows a variety of objectives to be met: First, it provides an analytical tool to document individual cases, and to appraise them in relation to more abstract sustainability goals. Second, through the process of documenting and analyzing/appraising individual cases and juxtaposing them to each other, the framework brings to fore where knowledge is weakest and empirical evidence is absent. These "gaps" pertain to individual cases and to the collective of cases and are potentially critical points for future documentation and research. For example, gaps related to individual cases become apparent when one integrates studies conducted by different authors on the same case study; as some authors focus on sustainable housing, others on the process of innovation, and others on community engagement and government interaction or the role of the hazard on that sustainability initiative. Gaps across the cases may relate to the sustainability appraisal as some studies focus more on process than (sustainability) outcomes; and some of those focusing on outcomes explore specific topics (e.g., renewable energy, mental health, community resilience).

Third, through systematic comparison, it enables eliciting the specific mechanisms that appear to be significant in sustainability transitions across multiple cases, especially when the empirical findings are triangulated with stipulations in the literature and future empirical findings. Thus, it provides an initial basis for

generalization from empirical evidence. For instance, within the disaster transition arena, the role of sustainability liaisons as well as research collaborations to inform local sustainability aspirations by using pilots to support community learning and testing of ideas deserve further research. Research collaborations could also help with some of the barriers encountered such as facilitating monitoring and participatory evaluating of processes and outcomes.

Fourth, applying the framework to the cases suggests that it is important to situate the local sustainability transition in relation to its interactions with transitions happening at higher scales or in related locations concurrently, in order to ensure a synergistic interplay between local goals and broader aims of system sustainability (Eakin & Wehbe, 2008). Specifying these "touch points" will illustrate how the disaster specific transition is supported by interactions with non-disaster locations and can mobilize them strategically for their efforts. This adds to existing observations about the hindering role of the broader context and macro-trends (Tierney, 2012; Pelling & Dill, 2010; Christoplos & Rodriguez, 2010).

Scholars of disaster and sustainability transition studies indicate that for sustainability transitions to be successful in the long-term the transition needs to be conceived as a multi-level intervention (Schensul, 2009), which is grounded locally but connected to higher-level processes through diverse forms of social capital (Vallance, 2011). Bonding capital connects people in the disaster transition arena with each other and with their constituencies; it emerges due to the shared experience of vulnerability and disaster survival or expressions of empathy. Bridging capital refers to connecting sustainability initiatives with each other, which would strengthen them individually and

as a whole. Linking capital refers to people working locally on the ground who have been

able to make connections with officials in state agencies or international organizations

and hence receive their support and access to their resources.[13] In future applications of

the framework, the specific and complementary role of diverse third-sector organizations

in building social capital, in particular bridging and linking capital, deserves more

analysis in order to better understand their varying abilities to act as change agents and

work across sustainability initiatives.

Lastly, the application of the framework can also help tracking sustainability

transitions over time, which can illuminate the role of the window of opportunity as well

as the opportunities created through the recovery process for advancing sustainability.

The theory frames WOO mostly as opening once, immediately after impact, and for a

limited period of time. Nevertheless, some suggest that such framing might not apply to

certain actor groups; e.g., Christoplos, 2006 stipulates that NGOs may be more effective

in leveraging opportunities in later stages of the recovery. Moreover, that framing hinders

awareness for the pathways created by many small steps that eventually led to substantive

changes if one is able to trace the pathway. For instance, Frühling, 2002, concluded that

the specific sustainability interventions implemented by the Swedish International

Development Agency (SIDA) in the aftermath of Hurricane Mitch 1998 failed. Yet,

SIDAs efforts to get agreement for the Stockholm Declaration gave rise to a series of

measures that—years later—contributed to reductions in social and ecological

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[13] Becker & Reusser (2016) undertook a similar effort bringing together transition management theory with disaster recovery approaches to examine the use of a multi-level perspective to describe disaster-related transitions and their barriers.

vulnerabilities; at least in Honduras and Nicaragua. The notion of the WOO also entails

the question whether it can be mobilized to achieve desirable systemic shifts over time.

While not all cases indicated systemic shifts some do, such as Krausirpi where

McSweeney & Coomes (2011) identified systemic improvements of the region's socio-

ecological systems or the American case studies, which instituted a new disaster recovery

strategy around sustainable rebuilding.

How can these achievements of systemic shifts in a region or a sector be

replicated and extended to become systemic in a broader sense? It seems that learning

about these achievements and how they were brought about could inspire local

conversations pre-event whether and how these practices might be adapted to advance

sustainability aspirations in one's own local context. Epping-Jordan and colleagues

(2015) conclude that across the diversity of the mental health care cases several common

lessons are derived how to leverage post disaster opportunities for substantiated change,

including adapting a long-term perspective from the outset and focusing on system-wide

measures that address both new onset and pre-existing issues. Similarly, scholars argue

that lessons can be learned for advancing sustainability during disaster from the

American case studies, even if future disaster-affected places will not have the "perfect

storm" in terms of resources and attention; they key is that these lessons are considered

(Rozdilsky, 2012; Schwab et al., 2014).

In order to systematically explore these questions and supporting learning from

each other, we believe that building a catalogue for cases concerned with seizing WOO

for change towards sustainability would be a first foundational step. It would allow

various contributors—scholars and practitioners—alike, to add their empirical and

theoretical data about their case, to complement information about an existing case, and to compare across cases. This objective is informed by an approach successfully modeled by Dr. Eleanor Ostrom, who laid the foundation for a growing catalogue documenting the ways how communities succeeded in sustainably managing their common pool resources. This catalogue enabled theory building and practical action in crucial ways for common pool resource management.[14] While the collection of data and building of theory would necessarily be incomplete, the catalogue would represent an ongoing effort to share experience, engage in mutual learning, and help develop theory. It would contribute insights for individuals and organizations how to prepare pre-event for leveraging opportunities created by disaster and sustainable disaster recovery.

Conclusion

We now have an incipient collection of practices used by a few communities to leverage disaster in the pursuit of sustainability. With the framework being the first step, more needs to be done, such as creating a catalogue of cases to offer a systemic way to think through cases and derive of lessons. Next, and more challenging, is translating identified practices and recommendations for seizing WOO for sustainability into action and making this translation a part of preparing for sustainable disaster recovery, that is: preparing for the ability to leverage opportunities for change towards sustainability. In the absence of such alternative practices and sustainability visions, the (old) ideas laying around will perpetuated after the disaster (Milton Friedman).

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[14] The catalogue, the Socio-Ecological Systems Library, is managed through Arizona State University's Center for Behavior, Institutions and the Environment. It can be accessed here: https://seslibrary.asu.edu/

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SEIZING OPPORTUNITIES FOR CHANGE TOWARDS SUSTAINABILITY

DURING DISASTER RECOVERY: THE CASE OF ACEH, INDONESIA

Abstract

Progress on sustainability challenges such as climate change, rapid urbanization, and socio-economic polarization, has been slow, despite the increasing urgency that sustainability challenges create for local communities and that they aggravate risks of disasters and hazards. On the flipside, disasters are recognized as opportunities to introduce change. There are change processes that serve the interests of particular groups at the cost of the public good have been well researched. In contrast, few studies research processes that seek to introduce change towards sustainability. Therefore, this study looks at how people and their organizations, in the midst of devastation and loss, were able to envision and introduce change towards sustainability, and maintain introduced changes over time. Drawing on literature of transformation, which describes change agents in normal times, this study characterizes these individuals as Sustainability Change Agents (SCAs) acting in disaster times. The study selected the Aceh-Nias recovery process from the Indian Ocean Tsunami in 2004, as it is a controversial case. Most lament the opportunities missed for development despite or because of the money and support available. Meanwhile, few document opportunities seized for development and sustainability. The study explored these pursuits towards sustainability along a spectrum of fields relevant to daily life and interviewed people involved in moving the sustainability pursuits forward. Findings suggest that SCA emerged from the onset of the disaster and during the disaster recovery phases, even though sustainability was not part

of the mission of frame-setting governmental and multilateral recovery processes. The SCA's abilities to effect change depend on their agency and the agency of their network as well as on contextual factors, including the complexities of the disaster arena and the political situation after the end of the government-led reconstruction and rehabilitation phase. Practical implications of this study include that the emergence of SCAs does not need to be left to chance; it can be supported through capacity building. This includes education and training to support the emergence of SCAs as well as building awareness among key actors in the disaster arena about SCAs' efforts to leverage opportunities created by disaster for change towards sustainability in normal times. The SCAs efforts are a vivid reminder to actors in the disaster arena to connect their disaster recovery activities to broader sustainable development processes so that disaster recovery activities translate into development.

Introduction

On December 26, 2004, the Indian Ocean Tsunami ravaged the coast of Aceh, the northern province of Sumatra, Indonesia. In the wake of this devastating disaster, then President of Indonesia, Susilo Bambang Yudhoyono, declared: "We will rebuild Aceh […]. And we will build it back better." – foreshadowing the 'building back better' concept promoted by Bill Clinton, leading the UN Secretary-General's Special Envoy for Tsunami Recovery (Fan, 2013).

The phrase of 'building back better' alludes to the notion of disasters as opportunities for positive change (Agrawal, 2011). Aside from their destructive powers, disasters often trigger resource inflow, media attention, and political reform. For

example, after the tsunami devastated Aceh, key stakeholders were able to convert the short-term interests in mental health problems into an improved mental health care system, which serves now as a role model for other Indonesian provinces. Such processes would otherwise have needed a reform process over decades (Epping-Jordan et al., 2015).

These opportunities for positive change, however, need to be seen and seized. Prominent studies documented how corporate and state actors collaborated on leveraging disasters in the pursuit of a neoliberal agenda, benefiting mostly partial interest groups at the expense of public welfare, environmental integrity, and social justice (Klein, 2007; Gunewardena & Schuller, 2008; Gotham & Greenberg, 2008). In contrast, less research exists on those cases where disasters were leveraged to promote change towards sustainability. These efforts led to improved livelihoods, resource maintenance, social justice, and reduced disaster risks (McSweeney & Coomes, 2011; Swearingen-White, 2010).

Advancing sustainability is imperative, considering the urgency of sustainability challenges, such as climate impacts, socio-economic polarization, and loss of biodiversity and habitats (Rockström et al., 2009; UN SDGs, 2015). Yet moving sustainability forward has been a hard and slow process, impeded by path dependencies in development and inertia in human behavior (Van der Leeuw et al., 2012). Thus shocks that disturb such inertia can potentially play constructive roles. Change towards sustainability can be possibly accelerated when post-disaster windows of opportunity are seized strategically to navigate change (Birkmann et al., 2009). However, scholarly work on how these opportunities are seen and seized is only slowly accumulating. We have limited

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knowledge on what factors facilitate such transitions following disaster, and how the devastation of disasters affect the capacities of actors to affect change.

Using the case of recovery initiatives implemented in Aceh-Nias following the 2004 Indian Ocean tsunami, I ask what changes occurred in development processes and outcomes, and to what extent did they contribute to sustainability? Second, how were people (and their organizations) able to pursue these changes in Aceh, in the midst of devastation and loss after the Indian Ocean Tsunami in 2004? As various studies documented the changes in different fields, e.g., housing, livelihoods, and infrastructure, this study addresses the first research question in summative ways, focusing on the sustainability appraisal and details the practices of people pursuing change towards sustainability. Drawing on existing work on change agents in transformation processes in normal times (e.g., Westley et al., 2013; Turnheim et al., 2015), this study characterizes these people as Sustainability Change Agents (SCAs), working in disaster times, i.e., people in Aceh who deliberately pursued change towards sustainability after the 2004 Indian Ocean tsunami disaster. The findings indicate that SCAs emerged from the onset of the disaster and during the disaster recovery phases, even though sustainability was not part of the mission of frame-setting governmental and multilateral recovery processes nor was it an express objective of the UN's 'build back better' propositions[15]. While SCAs were able to see and seize changes towards sustainability, some of these changes—in terms of the social practices—often withered away or were overruled by political processes.

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[15] United Nations (2006) Key Propositions for Building Back Better: A Report by the UN Secretary-General's Special Envoy for Tsunami Recovery, William J. Clinton.

Practical implications of this study include that the emergence of SCAs does not need to be left to chance; it can be supported through capacity building. Education and research can contribute to the emergence and effectiveness of SCAs as leaders; and awareness among practitioners in disaster risk management about the work of SCAs can stimulate thinking about linking disaster recovery efforts to broader sustainable development processes.

Research methods

The research presented here is primarily based on three months of fieldwork in Indonesia in 2014. Eighty semi-structured interviews were conducted; however only some interviews addressed the role of "Sustainability Change Agents" (SCA) i.e., individuals (and their organization) who deliberately see and seize opportunities for change towards sustainability in the midst of disasters and work to sustain introduced changes over time. In section 4 Results, I will present an overview of some characteristics of the SCAs involved in this study.

A key characteristic to identify a Sustainability Change Agent was that they explicitly pursued goals related to sustainability principles (e.g., equity, peace, nature conservation, or viable natural resource-dependent livelihoods) or even a comprehensive notion of sustainability, which integrates core sustainability principles. As reference, I used an accepted set of sustainability principles compiled by Gibson (2006), who also provides a basic definition of sustainability activities as meeting the challenge to provide "decent livelihoods for all without wrecking the planet" (ibid. 171). As will be shown in the sustainability appraisal instrument, this set of sustainability principles encompasses

the United Nations' Build Back Better propositions, introduced by the Bill Clinton, in his role as UN Secretary-General's Special Envoy for Tsunami Recovery.

The interviews were the major source to understand the role of the SCAs as well as to record the changes and respondents' perception whether these changes are positive (increasing sustainability) or negative (decreasing sustainability). Accounting for the perception of respondents, especially those involved in sustainability transitions, is crucial, because perception shapes motivation, action, and strategies (Turnheim et al., 2015). Nevertheless, I supplemented respondents' appraisal with reference to literature and reports as some respondents provided only indications, due to limited recall or due to the extend of the disaster affected areas, which made it difficult to keep an overview.

I recorded reported changes for an average set of daily activity fields. Daily activity fields compile actions and behaviors executed during a regular day of most individuals. They have been classified into housing, working, educating, eating, shopping, recreating, worshipping, engaging, caring, communicating and being mobile (Kahneman et al., 2004; Forrest & Wiek, 2014). Carrying out their activities, individuals recursively draw on structures (infrastructure, formal and informal rules) either confirming or altering these structures (Giddens, 1984). While all changes were influenced by the 2004 Indian Ocean Tsunami, changes originated at different times, including prior, during, and after the tsunami. Next, I allocated each change to a pertinent sustainability principle (Gibson, 2006) and based on the respondents' qualification and the literature, I identified the change as contributing to or hindering progress towards this sustainability principle. To further clarify progress towards sustainability, I differentiate between positive changes that enhance sustainability of the recovery (changes benefitting

disaster affected populations mostly during recovery periods) and positive changes that enhance sustainability (changes benefitting the broader public and available over the longer term). The objective of the sustainability appraisal was to have a standard, external evaluation of progress towards sustainability that could serve as a common benchmark for what changes could be considered "positive" in relation to sustainability, recognizing that few, if any, of the actors in Aceh had all of these explicit sustainability principles in mind as they mobilized to act after the disaster.

Interviews were conducted in the province of Aceh, mainly Banda Aceh, as well as in Bandung, Jakarta, and Yogyakarta. Contacts were identified through the snowball method. The research received approval by the institutional review board at Arizona State University as well as by the Indonesian Ministry of Research and Technology.

To guide the structure for the questionnaire and the analysis of interview data, I referred to a framework, which I developed elsewhere (Brundiers, 2016). The framework synthesizes pertinent concepts from disaster research[16] and sustainability transitions and transformations[17] in order to schematically explain how disasters create opportunities for change towards sustainability or unsustainability (see fig. 3).

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[16] Concepts from disaster research include the pressure-release model (Wisner et al., 2004), the idea of disasters as catalysts for change (Solecki & Michaels, 1994; Birkmann et al., 2009; Pelling & Dill, 2010) and of sustainable recovery (Berke et al., 1993).

[17] Concepts from sustainability transitions include the transition arena or shadow networks (Loorbach, 2010; Olsson et al., 2006), a logic model to reconstruct solutions-oriented pathways originating in niche-development (Forrest & Wiek, 2014) as well as ideas around transitions comprising of multiple co-existing pathways (Leach et al., 2010; Wise et al., 2014) whereas the pathway evolves adaptively depending on the framing applied by those involved (Wise et al., 2014).

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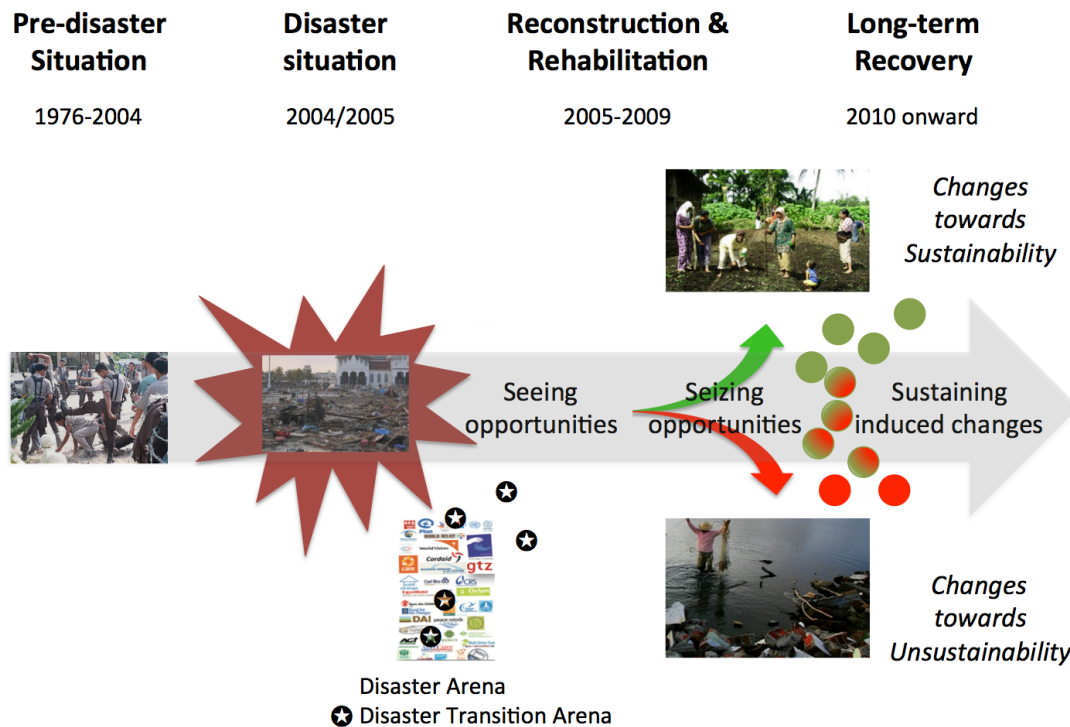
Figure 3. Simplified framework illustrating disaster arena and disaster transition arena.

Figure 3 schematically illustrates the framework explaining how disasters create opportunities for accelerating change towards sustainability or unsustainability. It also depicts the disaster arena and the emerging sustainability change agents, who are a subset of the actors participating in the disaster arena (illustrated through the star icons).

Background of the case study

Although the contexts of the case study related to pre-disaster, disaster and post-disaster times is rich, entailing several layers, this article touches only on those factors that most SCAs identified as enabling or hindering their work. In order to represent the perspective of these SCAs, I will include their quotes in describing the case study background.

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Pre-disaster context: A major challenge reported by most SCAs related to addressing the societal effects created by more than 30 years of civil war between the Aceh Freedom Movement, GAM (Gerakan Aceh Merdeka) and the Government of Indonesia (GoI); in particular the erosion of trust. Furthermore, SCAs worked in a context where the state of Indonesia was an emerging democracy; decentralized and democratic governance structures and the role of NGOs were still evolving (Heijmans & Sagala, 2013). As the area was closed off from outside interactions, only few international and national organizations were allowed to work in Aceh during martial law. They alerted the world to the disaster. The SCAs emanating from these organizations self-reported that they were instrumental in facilitating interactions because they had trusted relationships with local populations, which the SCAs had developed over years of living in Aceh.

Disaster context: On December 26, 2004, a series of devastating tsunamis hit the coastal zone of Aceh. Indonesia was the hardest-hit country as the triggering earthquake, with a moment magnitude of 9.1 had its epicenter off the west coast of Sumatra (USGS). The massive devastation triggered waives of support. Figure 4 provides an overview of the loss and damage caused by the tsunami and of key infrastructures built post-tsunami (Bappeda Aceh, 2012). The 2004 tsunami was an unprecedented event for Indonesia and the world: its complexity exceeded the capacity of international, national, and local actors.

Disaster impact:	Destroyed	Rebuild	Recovery Efforts
People displaced	635,384		
People killed	127,720		
People missing	93,285		
Small-medium enterprises (SME)	104,500	195,726	Received assistance
		155,182	Laborers trained
Houses	139,195	140,304	Permanent houses built
Hectares of agricultural lands	73,869	69,979	Hectares of agricultural lands reclaimed
Teachers killed	1,927	39,663	Teachers trained
Fishing boats	13,828	7,109	Fishing boats rebuild/provided
Religious facilities	1,089	3,781	Religious facilities built/repaired
Road kilometers	2,618	3,696	Road kilometers constructed
Schools	3,415	1,759	Schools built
Health facilities	517	1,115	Health facilities constructed
Government buildings	669	996	Government buildings built
Bridges	119	363	Bridges constructed
Ports	22	23	Ports constructed
Airports, airstrips	8	13	Airports or airstrips constructed

Figure 4. Overview of loss and damage and reconstructed physical infrastructure.

Adapted from: Bappeda Aceh, 2012.

Post-disaster context: Despite the devastation, the disaster enabled leveraging three foundational opportunities for significant change in Aceh. First, the disaster resurrected the peace process culminating in the Helsinki Memorandum of Understanding (2005) between the GoI and the GAM. The MoU was translated into The Law of Governing Aceh (2006) enabling local governance, including first elections in 2006, leading to the election of Aceh's first "green governor". [18] Second, Dr. Kuntoro Mangkusubroto was tasked to establish the Agency for Rehabilitation and Reconstruction (BRR: Badan Rekonstruksi dan Rehabilitasi). He is a widely respected individual who

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[18] The first governor elected after the end of the civil war was dubbed as a "green governor" as he launched the province's green economic development program and instituted a moratorium on logging. However, his title as "green governor" has been revoked because he has granted a concession to a palm oil company in a protected forest area (Orangutan Conservancy, 2012).

had demonstrated accountable leadership and political savvy when serving in public office and as CEO of state-owned companies. As professor of decision science he employed evidence-supported approaches to establish and run BRR as an organization committed to integrity, flexibility, and adaptive learning in a situation of uncertainty and high stakes. Third, the Government of Indonesia (GoI) issued the law 24/2007 on Disaster Management. It codified the paradigm shift from disaster response to disaster risk reduction, requiring development to account for impacts of hazards, and instituted the National Disaster Planning Agency (BNBP), designed after BRR's governance models (Trustrum, 2015; Djalante et al. 2012).

While many SCAs argued that these foundational opportunities paved the way for their subsequent sustainability efforts, they found that the disaster recovery processes also posed obstacles for their work. First, the disaster arena was crowded with more than 1000 funding and implementing partners, 6700 projects and spending almost USD 7 billion (Bappeda, Aceh, 2012). Given this big number of players, the disaster arena was also highly competitive, and awash in money, and organizations often acted without being subject to external review. Pervasive corruption made monitoring and formative evaluation challenging, which would be important in order to guide sustainable recovery (Guarnacci, 2012). One SCA stated: "To my knowledge, there were lots of assessments done on response, but little on recovery. Too many organizations pulled out, because there was too much corruption" (RI_66). Many funding partners also had their donations earmarked for response and scheduled to be spent fast. Several SCAs complained that this made reallocating funding to sustainability-oriented long-term recovery efforts and coordinating activities with other organizations difficult. Furthermore, advocating for

sustainability was challenging as explicit sustainability objectives were lacking in guiding

missions of BRR, multilateral organizations and International Non-Governmental

Organizations (INGOs) as well as in the UN's Build Back Better propositions (Lassa,

2010; Guarnacci, 2012; Fan, 2013).[19] Second, many of the organizations involved in

recovery efforts overwhelmed communities with requests for partici¬pation in

community engagement activities, creating an experience of a "second tsunami" for many

communities (Phelps et al., 2011). As organizations often competed with each other, they

also paid people for participating in their community engagement activities. This

monetary approach introduced a "beggar mentality" (RI_44) and dis-incentivized

traditional forms of collective action (RI_26) and most SCAs struggled to cope with the

resulting behavior of project participants: "What they wanted was the money and to be

taken care of. They were spoiled by the attention that they had received" (RI_75). To this

day, the legacy of the "second tsunami" continues to pose challenges for those SCAs who

continue to work in Aceh. One SCA empathizes with project participants' reluctance to

commit to self-direct their long-term recovery projects: "People have seen so many

engagement strategies already – it's hard to convince them to join" (RI_78). A third

challenge for the work of SCAs emerged because tsunami recovery and conflict

resolution processes were poorly aligned, leading to inequitable treatment of conflict- and

tsunami-survivors and insufficient social reintegration of ex-combatants (Inoue, 2015).

Ex-GAM leaders, many of them now being in governmental leadership positions,

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[19] The BRR mission focused on housing and infrastructure, capacity building of local government and social institutions, regional economic revitalization, and prioritized peace building and accountability (Phelps et al., 2011).

continued practices of corruption, extortion, and nepotism, hindering social reintegration (Aspinall, 2011). This aggravated complex social fragmentation along class, ethnic, and age categories as well as geographic regions. Many of those SCAs who worked in both tsunami and conflict affected areas shared their difficulties in succeeding with promoting social cohesion, equity, and transparency through collaborative projects with communities.
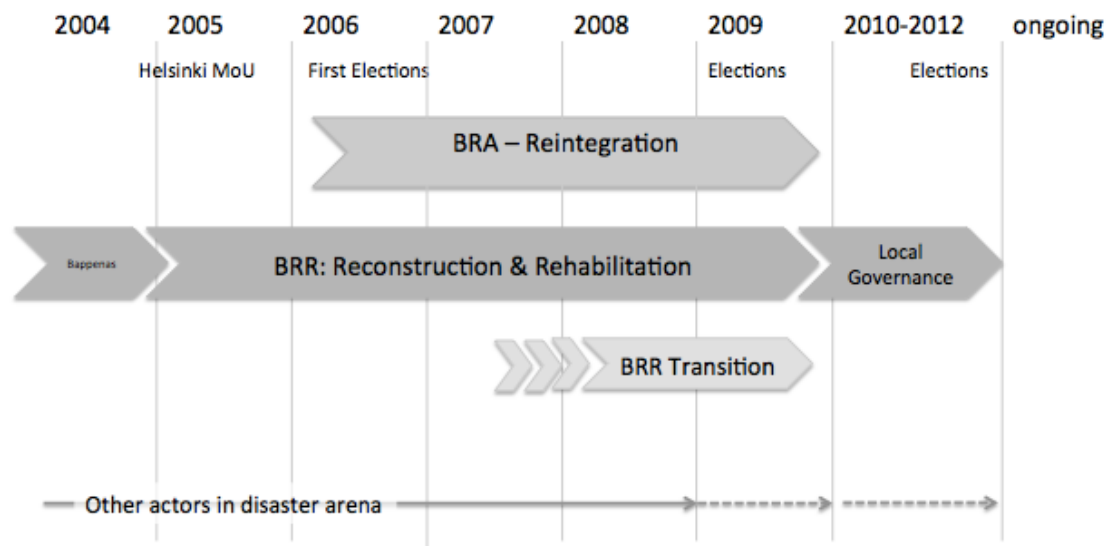
Figure 5. Timeline depicting the set of government-led phases of disaster recovery

The timeline depicts the government-led disaster reconstruction and rehabilitation process, the social reintegration process for ex-combatants, and the transition to local governance, which was enabled through preceding elections. They were led by the Agency for Rehabilitation and Reconstruction (BRR: Badan Rekonstruksi dan Rehabilitasi) and the Aceh Reintegration Agency (BRA: Badan Reintegrasi Aceh). With BRR winding down its activities by 2009, most actors were leaving the disaster arena and only few kept their operations or returned at a later stage to Aceh (see: dotted line).

The transition of recovery governance from BRR to local governance by local governments was well prepared by BRR and key partners, e.g., through the Aceh Government Transformation Program (see fig. 5). However, many organizations failed to organize successful hand-over of assets to the Governments of Indonesia and Aceh, set up coordination mechanisms and build local capacity to maintain assets. The hand-over was important, because almost 70% of all donations were "off-budget"; i.e., unaccounted for in the budgets of Acehnese government entities and GoI. Thus, these assets were not part of governments' property and responsibility. Failing to transfer these assets and the associated ownership and responsibility from donors to Indonesian government entities, undermined local governance and recovery. One SCA stated his exasperation:

> For the last [years] we were banging very hard! Each time there was a meeting, I still remember, I was insisting: asset transfer […] we want to have no unrecognized assets. We want to have a clear list of all the assets, are properly transferred, properly documented within the budgetary system of the government of Indonesia. (RI_56)

Local governments themselves also failed to harness the recovery phase to build their capacity for policy-making, budget planning and spending, and were unable to maintain quality standards among their staff. The resulting challenge for sustainability initiatives was that slow and ineffective spending (Worldbank, 2008; RI_20) created rather than resolved sustainability issues. For instance, spending in 'roads and bridges to nowhere', accelerated encroachment into fragile forest environments threatening biodiversity, liveli¬hoods, and disaster risk reduction functions and aggravated negative effects of sprawling developments, illegal logging, and palm oil plantations (verbal

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communication by Singleton, 2014). Furthermore, those SCAs who worked in government entities found it difficult to sustain changes and keep advancing sustainability, as a bureaucratic culture based on rank and seniority instead of merit and knowledge at times discouraged extra efforts among staff (RI_71).

Leveraging the Disaster for Sustainability

Despite these contextual challenges most SCAs found ways to introduce positive changes towards sustainability, and a few continued to pursue their efforts to this day. Nevertheless, sustainability was not always an explicit goal of the SCAs. Each SCA and its associated organization had specific and general goals, pertaining to social, environmental, political and cultural change. Appraising these efforts towards these individual sustainability goals within a common framework of sustainability principles indicates the extent to which the SCAs' collective efforts were supporting sustainability transitions, and in what ways. The practices used by SCAs can inform future efforts to "steer" development towards sustainability, even in later stages of disaster recovery.

Sustainability appraisal of select changes. Table 3 illustrates the appraisal schema based in the overarching sustainability principles (Gibson, 2006) and their criteria. To illustrate the relationship between the sustainability principles/criteria and the UN's Build Back Better Propositions, the propositions are listed next to the corresponding principle/ criterion [P]. The table also entails a selection of the reported changes, to illustrate how a change was identified as positively or negatively contributing to the criterion. Each change also indicates the pertinent daily activity field in parenthesis, e.g., [H] for Housing.

Table 3

Overview Of The Sustainability Appraisal Scheme And Initial Appraisal Results Of Select

Changes Across Diverse Daily Activity Fields

Enhancement of Basic Sustainability Principles	
Natural Environment & Natural Resources	
1. Were actions taken enhancing the quality of water, soil, air, or biodiversity?	+ Forest protection [W, Ca]; Waste mgmt. infrastructure [H,W]
	- Green economic development program on halt [W, Ca]
2. Were remediation actions on contaminated water, soil, air, or ecosystems undertaken (not only related to the disaster)?	+ Coastal mangrove belt [H, W, Ca]
	- Consequences of mining [W]
3. Were land-use and urban development plans adopted that minimize impacts on the natural environment?	+ Green economic development programs and plans [H, W, R]
	- Encroachments due to weak enforcement of plans [H,W,R]
4. Were actions taken to use construction material as efficiently as possible?	+ Sustainable brick making on microenterprise scale [H, W]
	- Timber demand severely diminished primary forest [H, W, Ca]
5. Were actions taken to reduce future overall energy use and to support renewable energy?	+ High potential for micro-renewable energy proven [H, W]
	- Public transportation was not considered a priority [M]
6. Were actions taken that reduce future overall water use?	No mention
	- Evidence of climate change leading to drought in some areas of Aceh [Ca]
Social Well-being	
7. Were cultural heritage sites preserved or commemorative places built, which support communities in healing from trauma, expressing values of the collective, or a source of pride?	+ Mental health system [Ca], local heritage protection [G, R]
	- Inequitable treatment of conflict-survivors/rebels [H, W, Ca]
8. Was quality housing and land (including formal titling) provided and thereby socio-economic displacement or segregation avoided?	+ Shared ownership of land titles for husband & wife but weakly enforced [H]
	- Some houses rebuild on and relocated to risk prone or unsuitable land [H]
9. Was social cohesion in communities increased and disadvantaged groups better connected?	+ Free public education [E]; efforts to promote intercultural exchanges [G, R]
	- Sharia law restricts ethnic minorities, women's rights [WS, G]
10. Were civic engagement and self-efficacy enhanced to foster democratic participation in community governance by all groups? P1	+ Active civil society [G]; youth training for civic leaders [G]; Sustainability Caucus Aceh w/ legislators and scientists [G]; Internet available, media [Co]
	- People became more open to voice concerns & more resistant to change [G]
11. Were public facilities, infrastructures, and services actively maintained or created for all daily activity fields?	+ Public facilities rebuilt in better quality and extended in numbers [G]
	- Incomplete asset transfer; lack of maintenance ability among local gov [G]
Livelihoods & Public Finances	

12. Was meaningful and satisfying employment created in the community offering sufficient income and livelihood opportunities? P8	+ Some support of micro-entrepreneurs and cooperatives [W]
	High levels of poverty and unemployment remain [W]
13. Was the local economy (that the community is part of) strengthened?	+ Cocoa, coffee, tourism with potential for local growth & sustainability [W, R]
	- Import of products discourages local production and exports profits [W]
14. Were public finances reorganized in a way that they work exclusively for public goods, are balanced, and governed in transparent, participatory, and accountable ways? P4, P6	+ Corruption-watchdog NGOs monitor spending [G, Co]
	- Aceh governmental spending is slow & insufficient; corruption, [various]
15. Was post-disaster funding used for long-term recovery in addition to emergency response?	+ Multi-Donor Fund focused on long-term recovery [various]
	- Most donations earmarked for response and fast spending [H, W]
16. Was post-disaster funding used in transparent, participatory, and accountable ways? P5, P7, P9	+ BRR adhered to integrity pact; local donors emerge [G]
	- Decision-making often not transparent / participatory [G]
Enhancement of cross-cutting sustainability principles	
Equity: Were benefits & costs of above actions equitably distributed considering P2	
17. all social groups, incl. disadvantaged and disenfranchised populations?	+ Cancelling of buffer zone ensured land ownership [H, G]
	- Remote areas suffer inequitable access to services [various]
18. present and future generations of the community?	+ Some civil society org adopt long-term view for change [G, Co]
	- Negative peace (absence of violence) imperils future of youth [E, G, W]
19. neighboring or otherwise functionally connected communities?	+ Declaration of few governors to conserve forest & alleviate poverty [W, Ca, G]
	- Lack of coordinated planning among districts across Aceh [G]
Adaptability: Were aforementioned actions...	
20. based on anticipation (looking 25 years), accounting for different possible future developments?	+ Diverse visions for economic dev.; public visioning: *New Aceh* [G, Co, E]
	- Lack of evidence-supported visioning and pathways [G, E]
21. enhancing resilience by incorporating disaster mitigation, risk reduction and sustainability? P3, P10	+ Increase in DRR efforts, some self-organized by residents [Ca]
	- Lack of integration between DRR, sustainability, religious philosophies [G, WS]
22. guided by clear long-term sustainability goals?	+ Sustainability Caucus Aceh facilitates cross-sector work [G]
	- Education poorly addresses sustainability & key groups don't prioritize it [E, G]

Table legend: Abbreviations for daily activity fields: [H]: housing, [W]: working, [E]: educating, [F]: eating (Food), [S]: shopping, [R]: recreating, [WS]: worshipping, [G]: engaging (Governing), [Ca]: caring, [Co]: communicating, [M]: being mobile.

The overarching picture is mixed. Positive changes were introduced along many activity fields relevant to daily life and all changes together support each sustainability criteria. Moreover, some sustainability principles seem to have received more attention than others. For example various positive changes relate to social well-being. Few positive changes address the principles of equity/equality (in particular intergenerational justice), adaptability (in particular long-term sustainability goals) and reducing resource consumption. In the summative appraisal of the changes, I include the corresponding numbers from Table 3 for each appraisal criteria in parentheses [e.g., #1].

With respect to *environmental dimensions*, the direction of development seems mostly negative. A number of sustainability-oriented policy drafts, spatial plans and pilot projects were initiated following the disaster, providing integrated and future-oriented frameworks [#3]. However, in most cases, the change in political leadership stymied their continuation (e.g., forest protection) and hence the realization of the plans' effects in terms of biodiversity protection [#1]. Projects that were implemented mostly addressed disaster-related issues. They paid less attention to remediation of pre-disaster contamination, for instance from mining activity, and to future-oriented reduction of pollutants (e.g., public transport was not a priority) and natural resource consumption (e.g., slow progress of renewable energy) [#2, #5-6]. The massive demand for timber during the reconstruction severely diminished primary forests. It led to creating voluntary

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guidelines for environmentally friendly sourcing of forest-based materials as well as launching initiatives that enhance the local craft of brick making [#3].

With respect to *social dimensions*, there were a variety of achievements that together provide an enabling foundation for future change. These include for instance, free public health care and education, a community-based mental health care system serving large parts of the province, a diverse range of active civil society organizations and critical voices including the voice of sustainability, and ongoing peace, although peace is fragile [#7, #10-11]. Further realizing the potential of these initiatives is necessary to effectively address the challenges of societal fragmentation related to economic status as well as ethnicity, gender, age and dividing lines during conflict times. Contributing drivers of these fragmentation processes include corruption, nepotism, increased regulations in sharia law and people becoming more resistant to change, while being simultaneously more open to voicing their concerns [#9-10]. As for the provision of quality housing, the direction of development was rather negative, considering the low quality of many houses, often requiring immediate repairs, and that some houses were rebuilt on or relocated to risk prone or otherwise unsuitable lands. Nevertheless, land titles were changed recognizing shared ownership of husband and wife; meanwhile women find it hard to claim this and other newly constituted rights (e.g., custody of children) [#8]. Local groups emerged that advocated for heritage protection and beautification of neighborhoods [#7].

With respect to *economic aspects*, the direction of development seems mostly negative, considering the persistent high poverty and unemployment rates, which

improved somewhat compared to conflict times but remain among the highest across the provinces of Indonesia [#12].

Funds for long-term economic development have been made available through the special autonomy funds resulting from the peace agreement and the disaster recovery as well as through Aceh's participation in the Government of Indonesia's poverty-reduction and other economic development programs [#15]. Nevertheless, allocating these funds effectively to develop a productive local economy that generates added value in Aceh [#13], especially within the agricultural sectors, proved difficult for the current political leadership [#14-16]. Many micro- and smallholder companies feel overpowered by economic matters being orchestrated through players in the neighboring provinces, in particular Medan, because "even the eggs sold in Aceh are imported from Medan" [#13].

The *cross-cutting sustainability principle of equity/equality*, which is necessary to ensure peace put greater emphasis on intra-generational justice [#17] than on inter-generational justice [#18]. While this focus was justifiable during the BRR reconstruction and reconciliation phase in order to promote peace, civil society leaders now worry about future generations. Hence, they invest in youth development and civic leadership programs while a group of civil society organizations actively promotes future thinking and visioning in order to keep the long-term transition (2007 to 2037) towards building a peaceful and thriving society in view. Little mention was made about efforts to consider how costs and benefits impact neighboring or otherwise functionally linked groups. Nevertheless, the first governor of Aceh together with a few other governors in similar situations signed a joint declaration to protect primary forest while alleviating poverty [#19].

The *cross-cutting sustainability principle of adaptability*, which is necessary to ensure long-term resilient and sustainable development, puts greater emphasis on resilience, to be primarily achieved through disaster risk reduction efforts, than on sustainable development [#21]. Although the Indonesian planning procedures request long-term plans, formally established long-term visions and options for development pathways as well as inter-generational justice and sustainability goals are mostly missing [#20, 22].

The UN Build Back Better Propositions cluster around a few of the principles and their criteria presented in table 1. The majority of propositions relate to the principle of livelihood and public finances (P4-7, P8-9), highlighting the leading roles of state and local government vis-a-vis international players and encouraging early recovery activities to enhance livelihoods. A second cluster is around adaptability with propositions (P3, P10) focusing narrowly on disaster preparedness, risk reduction and resilience. Only few propositions address other sustainability principles such as social well-being with proposition P1 drawing attention to support primarily families and communities as drivers of the recovery and with proposition P2 arguing that recovery must promote equity and fairness. No proposition addresses the sustainability principle natural environmental and natural resources, which constitute the foundation of life, i.e., they are people's life-support system.

Although development seems to be dominated by negative trends, there were positive contributions to change and there continue to be positive potentials. These were enabled, in part, through particular people: the Sustainability Change Agents (SCAs).

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Practices of sustainability change agents. The SCAs reported practices they used to respond to opportunities. These can be categorized into existing categories of 1) seeing and 2) seizing opportunities for change towards sustainability, and 3) sustaining them over time (Fig. 6). This tripartite sequence has also been established in earlier studies (c.f., Gelcich et al., 2010, Westley et al., 2013).

Seeing	Seizing	Sustaining
Optimistic mindset	Prepared to take risk	Enhance local assets
Focus on sustainability	Collaborate and learn	Build social capital
Enabling environment	Co-create solutions	Use hands-on learning and pilots
		Plan hand-over strategy early
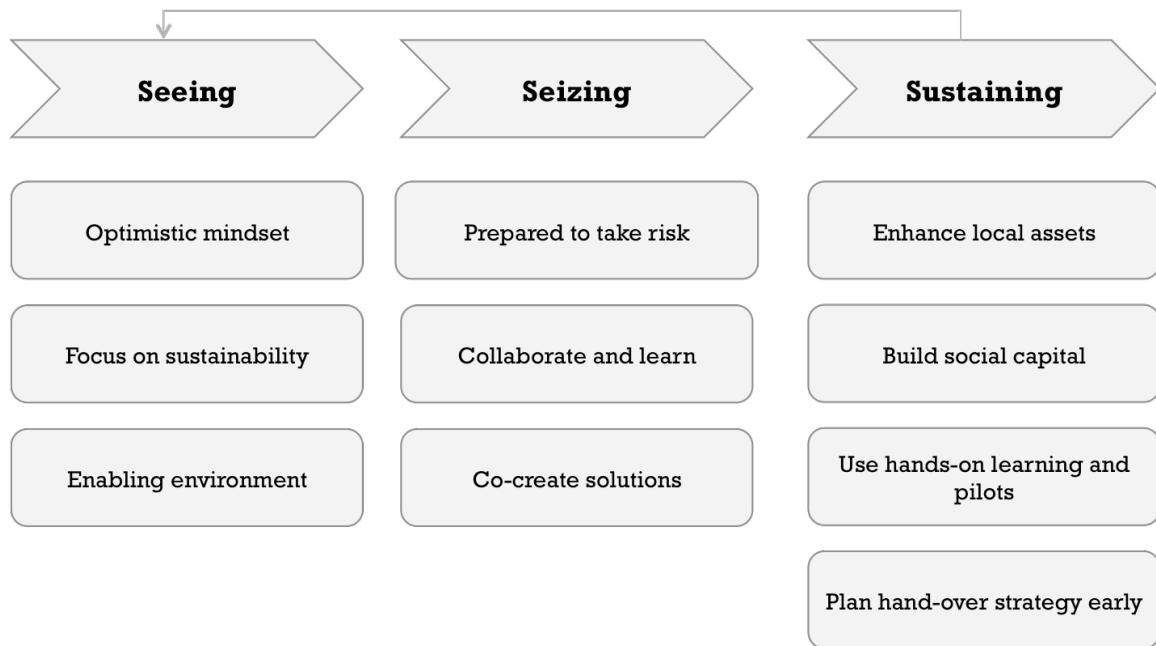
Figure 6. Main characteristics and practices across sustainability change agents in Aceh.

Before presenting the practices used across the SCAs involved in this study, table 4, below, offers an overview of some attributes characterizing the sustainability change agents involved in this study (N=50).[20]

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[20] Note this table is not the result of a self-reported description of the SCAs by interview respondents. I created this table based on my interpretation of the interview data after returning from fieldwork.

Table 4

Overview Of Some Characteristics Of This Study's Sustainability Change Agents Involved In This Research

Gender	Female	Male							
	20%	80%							
Age cohor	Junior	Senior	Retired						
	44%	56%	0%						
Stakeholder types	INGO	IO	Local NGOS	Nat Gov	Prov Gov	Local Gov	Private Sector	Research	Combinations
	16%	14%	26%	16%	4%	10%	4%	4%	6%
Daily Activity Field	Caring	Housing	Working	Planning	Engaging	Comm	Recreating	Educating	Worshipping
	16%	20%	20%	16%	16%	4%	4%	2%	2%
Sustainability principles	Social Wellbeing	Livelihood & Finance	Nat Env	Sustainability	Adaptability	Equity			
	44%	20%	12%	12%	8%	4%			

Seeing opportunities for change towards sustainability in a disaster context.

Respondents in the interviews conveyed that they were able to see opportunities because of their mindset. Such a mindset allows them, as observed by one respondent, "to ask questions related to opportunities at the front end—not just in the reconstruction and rehabilitation phases, as this then often leads to simply building back" (RI_66). Compared to others, they viewed their mindsets as emerging not fixed (RI_57); they are willing to take risks (RI_63) and embrace "thinking outside the box" (RIL_48). They also suggested a moral commitment: "their heart is also in the right place" (RI_56).

Most SCAs pursued select and individual sustainability goals such as justice and peace, environmental protection, or sustainable livelihoods. However, only a few pursued a comprehensive vision of sustainability (RI_70), (c.f., Table 4). Nevertheless, it was clear that for many SCAs, their deliberate focus on sustainability related goals was an important driver for seeing opportunities; but it was also a reason why these SCAs felt as if they were swimming against the stream. Sustainability was not an express objective of many actors in the disaster arena. As one senior SCA, with experience in many recovery

situations noted: "organizations are not ready for recovery, especially, they are not ready to implement sustainability projects" (RI_66).

In addition to these personal factors, there are also characteristics of an enabling environment, including their upbringing and work environment in Aceh. Table 4, below, indicates that SCAs can be typologized as "originators" and "first followers". The latter were mostly younger people working closely with the originators to help realize their ideas. They shared the originators' visions, values, and commitments, and later tried to implement such changes with their own teams and working relationships. For the most part, interviews were conducted with the first followers, as originators were often unavailable for interviews for various reasons (being abroad, deceased, scheduling conflicts). Nevertheless, the first followers, while describing themselves and their own journey, painted a rich picture about these pivotal figures. The SCAs are typically well-educated and work for domestic or international organizations that are well connected within Indonesia or abroad. They receive guidance and encouragement from their mentors and peers. While community members, government representatives and other stakeholders initially consider their ideas for change as "crazy", they often received official awards and public recognition at some point, nurturing their perseverance (RI_30). Lastly, they often have the personal and social freedom to dedicate themselves to a cause and invest their time. One SCA noted that he might have more time than others because he is not married and has no family (RI_33).

In short, these personal and social aspects of agency were identified by the SCAs as factors that enabled them to conceive of and envision sustainability efforts, and to believe they could leverage them during disaster times.

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Seizing opportunities for change towards sustainability in a disaster context.

The interviewees spoke in disparate ways about the challenges of taking advantage of a window of opportunity in order to initiate their sustainability initiatives in the fast-moving and competitive context of post-disaster recovery work. As one SCA noted

> Be aware that many people will want to have their benefit, especially in the post-disaster context. So, competition for the window of opportunity is high. They are all fighting. Because of the disaster, everyone will take the maximum they can. (RI_63)

> Gaining a foothold required strategic action. In the case of the interviewee quoted above, a carefully thought of series of steps led the interviewee and his organization to successfully place environmental protection and the livelihoods attached to these habitats, front and center in the economic development agenda of the Aceh recovery process.

> First, we focused on how to save the lives of our families and friends. Once we knew they were all safe, we went straight back to work. Second, environmentalists and environmental issues were already a minority. So, it was very important to quickly restore the little we had, restore all the environmentalist agencies from the government, the NGOs, etc. Third, you need to develop a way to build trust within the community and ensure them that you work for them. Hence, you need to take part, as an environmental organization, in the humanitarian efforts. This also allows you to ensure that the humanitarian organizations don't avoid the environmental aspects. […] Fourth, we started a campaign to the government. With this campaign we wanted to ensure that environmental protection must be mainstreamed. (RI_63)

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Although this SCA and some others engaged in response (by taking part in the humanitarian efforts), their main objective was long-term development and the response activities helped create the foundation for these activities. However, the focus on long-term development opened alternative opportunities.

Other SCAs interviewed resolved that in addition to coordinated steps, seizing opportunity also requires a reflective process. Each step needed to achieve a specific outcome, while keeping the eyes on the prize. Along the way, failures offered key moments for continuous learning, necessary in order to progress:

> You need to always be fast and make it fast. Show that you do something, while you are still making your proposal. Don't worry about mistakes – every morning, mistakes will knock at your door. By the evening you have to resolve them. Document everything you do; don't miss any opportunity to learn. (RI_68)

Part of this reflexive process entailed social learning and collaboration in order to identify and implement improvements. SCAs learned from others by traveling to sites, even to remote areas, and they invited others to come and teach them (RI_69). Many interviewees spoke about the importance of building on local knowledge and practice, and being inclusive when developing solution approaches. As one SCA explained, the idea was to support endogenous development and reduce dependence on external agencies:

> If you work in a disaster-affected area, you need to assess the local need as well as the local capacities [...] to see what is there and can be used for the disaster recovery related to rediscovering and producing foods, tools, health, and economic activities. If you don't have the ability to see these things that are

available to you, then the easiest thing is to pour everything inside, imported from all over the world. (RI_75)

Furthermore, a few SCAs emphasized the importance of working in the same environment as the project participants and requesting opportunities for job shadowing. They would then relate this information to (scientific) evidence about good practices and share their insights back with the community to discuss ways to innovate and improve. One SCA summarized this approach as follows: "The interesting part of all of this is the way we work: we teach the community who was teaching us before!" (RI_78). In this process, the SCAs want to be supportive of the group's plan, meanwhile they also want to ensure the plan is viable and therefore challenge the group to revisit aspects the SCAs identify as problematic. To this end, one SCA remarked, they "alert communities to the potential detrimental effects of their choices" and "introduce ideas from other places" (RI_75).

Collaborations with Indonesian Universities were part of this inclusive approach, contributing to place-based and evidence-supported solutions.[21] For instance, the mangrove reforestation was a problem during the reconstruction and rehabilitation. The mortality of seedlings was very high for various reasons (e.g., unsuitable seedlings due to varying levels of salinity, payment per seedling planted irrespective of outcome). One SCA, working for an INGO, explains:

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[21] The lack of consideration of scientific data led in some places to hazardous situations (e.g., deterioration of newly built roads due to changed precipitation patterns; inundation of houses due to lack of site assessments) (RI_66).

Our approach was different. We set up a collaboration with the Agricultural

Institute at the University of Bogor. Our mangrove forests actually flourished and

people started to realize that the fish population also flourished, because there

were again many more fish. This helped to restore the health of the near shore

fisheries. One reasons for the success was that – thanks to the excellent technical

assistance through the University of Bogor team – the project was able to identify

the right seedling for the right place. […] The University of Bogor team grew

these seedling varieties in the nurseries and then helped plant them. I do not know

to what extent people were aware of the environmental benefits that come from

mangroves; but people for sure realized that mangroves mitigate the impact of

waves and more immediately, were essential in helping to reestablish the

fisheries. (RI_66)

Another SCA noted that his organization became the go-to entity for

organizations seeking help for repairs of their sub-standard houses. Their reputation for

providing good quality houses reasonably fast, while accounting for scarce resources and

other constraints, was enabled through a novel construction approach, which resulted

from collaborations across various organizations, including the Bandung Institute of

Technology and the Ministry of Public Works (RI_26).

However, several of the SCAs interviewed articulated how the disaster arena

posed challenges to applying the above practices in order to co-create viable

sustainability pathways. A particular challenge was that money was mostly earmarked for

response and had to be spent rapidly to meet spending rates (RI_56). Similarly, another

SCA found this to be a major obstacle for pursuing sustainable development objectives:

"We were forced to receive AUS$ 1 million to be spent in three months for emergency aid only" (RI_75).

Lastly, seizing an opportunity, i.e., successfully initiating a project or program, does not guarantee that the initiative will succeed in terms of becoming part of institutions or a feature of the built or natural environment. The inability to sustain successfully initiated projects in Aceh led some SCAs to learn from their failure in order to better manage the transition from seizing to sustaining initiatives in future efforts. One SCA recalled the process of learning over the past years.[22]

> We initiated the Kampung [village] approach in Aceh. During the earthquake recovery in Yogyakarta we applied it again and strengthened it. During the earthquakes in Padang, we reapplied and further strengthened it. And now: it's 'patented'—it is a 'patent' of M! (RI_75)

Sustaining introduced changes over time. The interviewed SCAs identified a variety of mechanisms that make the initiated actions effective and sustain the project over time. One mechanism mentioned by most SCAs was to focus their energies on enhancing available capacities and using existing and sometimes latent resources. The quotes of two SCAs illustrate their attempts to enable people to tap into existing resources provided by the government and the private market:

> The goal of this is to help farmers establish a good track-record, which will help them in accessing markets and doing contracts with the private sector. (RI_13)

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[22] Similar examples include the *Rekompak* approach, developed with support of the World Bank (RI_73).

A key resource, which SCAs aimed to create and foster, was social relationships. Several SCAs emphasized how they sought to bring peer groups from remote areas with little access to knowledge and alternative networks together in order to support local and environmental production of coffee, cocoa or disaster resilient brick making, and in doing so, some even supported gender equity:

> When the women are coming for the trainings they are saying: 'Ohh, whenever there is a meeting, it is only for men. We are always at home'. They don't teach each other. They don't learn anything new from each other. […] So, the trainings that we do for them are an occasion for them to discuss many other things. (RIL_78)

Others made similar efforts, yet connecting project participants, for example, smallholder farmers or micro-entrepreneurs, to district and national resources and available government support or market institutions. For instance, SCAs linked village members to government entities, which then supported villagers in forming a cooperative. Another SCA explained his organization's efforts to link smallholder farmers with middle men in the supply chain to build capacity in smallholder farmers to connect directly with large players in the future:

> In order to link smallholder farmers with Cargill, [we] work with the traders, who have the role as middlemen and "liaisons". The traders then work with the trained farmers, who were trained by us. […] It is key for [us] that the large players employ [our] own people in order to support the project. (RI_13)

The objective was, as one SCA noted that "when you are not there, those people remember each other" (RI_78). Building a personal contact is a valuable resource in

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Indonesia. In addition to connecting project participants to available resources, many SCAs also endeavored to remove institutional barriers that hindered local economic development, in particular the banks' credit requirements, which in the past had not accounted for the situation of small- and micro-entrepreneurs (RI_57). Other SCAs facilitated access of small entrepreneurs to tendering processes supporting for instance competitiveness of their locally and environmentally friendly produced disaster-resilient bricks (RI_78).[23]

In short, these SCAs built up the entrepreneurial capacity of project participants (builders, farmers, home-industries). In doing so, it was evident that some organizations envisioned a pathway of investment to achieve the outcomes they desired: they led participants through stages of vocational training, then helped them apply their skills as interns in a business environment, then developed their entrepreneurial skills within a support network, and lastly supported them in running their own micro-enterprise (RI_13). Additionally, SCAs help build demand for the micro-entrepreneurs' products by creating credibility (through certificates, recommendations) and visibility (through awareness raising among stakeholders in government agencies and markets) (RI_66).

Another mechanism used by some SCAs was experiential learning (hands-on, active, on-site) and learning from real-time pilots and experiments (testing, providing proof of concept). These activities facilitated learning and other outcomes. They instilled confidence in people that change, here in terms of implementing local disaster risk reduction measures, is possible as one SCA explained:

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[23] Comparing the practice of this SCA with recommendations for sustainable reconstruction (c.f., Roseberry, 2008) indicates overlap between practice and recommendations, which may be validating both.

The experiences with realizing these projects through experimentation helped him

to change his own mindset and the mindset of other people. Initially, many people

laughed at him, saying this is not possible; he is crazy! They did not like him. But

he did it! He could show it is doable and how it can be done. Now, people like

him. They like him, because he gives them hope by showing how things can be

done. (RI_33)

Other SCAs used real-world pilots and hands-on learning to support conflict

resolution among community members, whose trust in people and written documents had

been eroded because of their experience in armed conflict, as one SCA pointed out in a

project involving farmers and fishpond owners:

This is why it is important to make them sit together and point out: 'You have the

paddy field here and because it has no drainage and channel, it mostly drains into

the fishpond, including the contaminants. But the fishpond blocks it. In a flood

situation, the paddy field cannot produce—so it is unproductive. Now, we are

trying to find a solution. (RI_28)

Using real-time pilots resulted in proof of concept and lessons learned. Some

SCA found that these results were useful in convincing legislators, who at times had

difficulties in understanding abstract theoretical concepts, as many of them were former

GAM members, who spent long periods of their careers in the jungle and joined the

political process after the peace agreement (RI_28).

Lastly, implementing real-time pilots helped identify how imported technological

solutions provided through international organizations (e.g., for waste water treatment,

waste management) could be locally adopted and maintained. It revealed problems, such

as apprehensions of staff because managing waste is regarded as a lowly job (RI_25), or lack of ability to train staff and keep them engaged (RI_19):

> We started with a small area first. It is not common here: waste water treatment or offsite sanitation. So, we tried to learn a lot about the regulation and how to run the system, and what are the problems and how the community can give. (RI_48)

Another mechanism SCAs mentioned to sustain their sustainability initiatives over time and ensure these investments become part of local institutions and infrastructures was to develop exit-strategies or hand-over strategies together with project participants, funding organizations, and pertinent government entities. Although it is allegedly common knowledge and practice to close projects with a hand-over strategy, this was not the case, not even among experienced multilateral organizations engaged in the disaster recovery (Nazara & Resosudarmo, 2007). One SCA stated: "A key issue I was fighting was that many of the multilateral organizations as well as the international organizations, did not have an exit-strategy. I fought hard that they thought of an exit-strategy." (RI_75).

Reflecting on their experience, some SCAs recommend that hand-over strategies needed to be developed at least one year ahead of the transition (RI_71). They should be executed in adaptive ways, as these SCAs found that some of their plans could not be realized as planned and required finding alternative approaches; sometimes even on the spur of the moment (RI_39). They argued that the foundations for a good handover were laid in part through applying the mechanisms described above (enhancing existing capacities, building social capital among project participants). Attention to social capital ensured that government authorities would be involved in the project early on and

continue the project after the external organization has left (see figure 7). To include this

practice, one organization changed its approach of providing infrastructure:

> Typically, we offer communities we work with a menu of options, e.g., different
>
> water supply solutions (wells, hand pump, access to public water supply sources).
>
> However, if there is an opportunity to connect the community water supply with
>
> the public water supply, provided by the government, then we don't offer the
>
> whole menu. We offer only this option. (RI_26)

These SCAs also stated that another part of a good handover related to collecting

the evidence of the program's effectiveness as well as shortcomings, to inform the

receiving government about what needed to be retrofitted (RI_71). Such evidence

emerged from face-to-face encounters (when officials met with program participants) and

from data collected over the course of the program through informal and formal

monitoring activities (RI_39).

Figure 7 below are my attempts to integrate respondents' explanations about the

mechanisms for an ideal-type hand over into a flow chart. The right part of the flow chart

indicates the efforts to connect project participants on the village level with higher-level

resources and government entities. The left part illustrates the additional coordination of

hand-over activities with the BRR during the recovery periods 2005-2009, as BRR to

record all projects and assets in its database to ensure their future management and

facilitate synergies among them. This way, externally supported development projects

became part of endogenous governance and asset management processes.
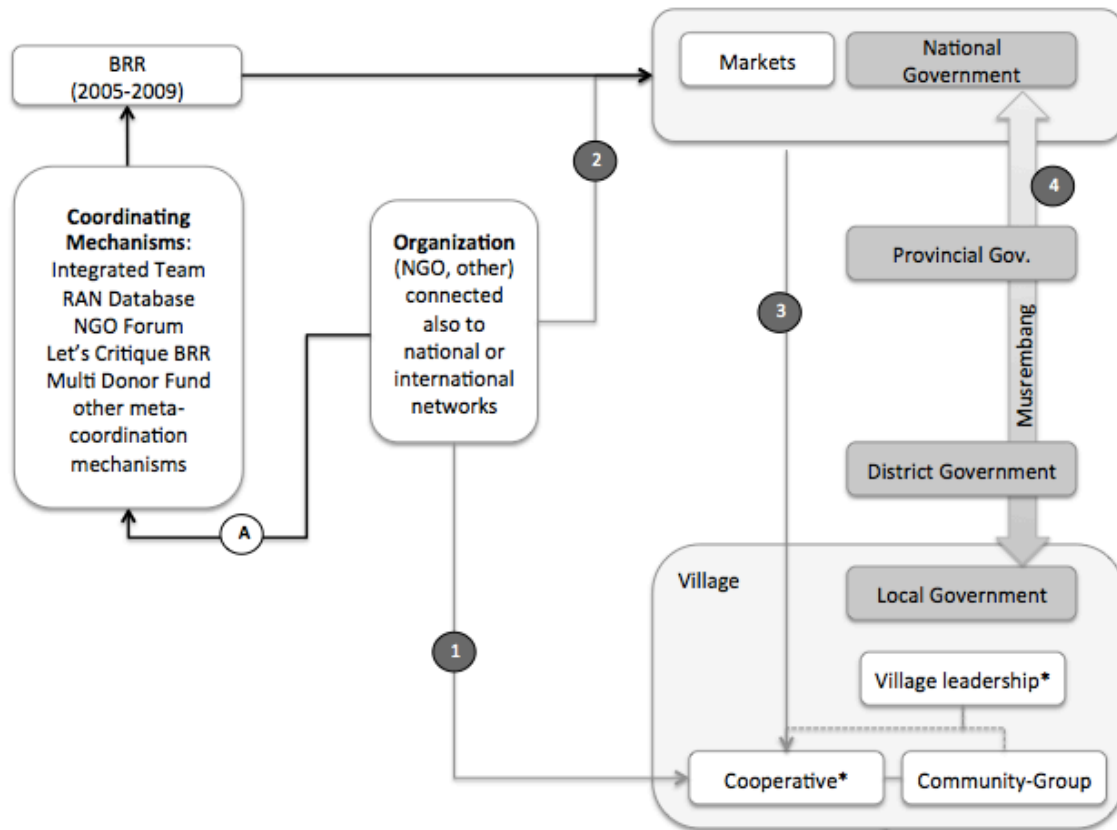
Figure 7. Schematic illustration of ideal-type hand-over processes.

The first step (1) in figure 7 for setting up a hand-over process during the government-led reconstruction and rehabilitation phase recommends that the organization help create formally defined institutions, such as a cooperative on the village level, as carrier of the project, by bringing peers together e.g., small holder farmers, brick buildings, home industries (these entities are marked with an asterisk (*)). (2) Next, the organization creates connections between the village level and national governments as well as markets to support project participants in leveraging these resources for their purposes. (3) In turn, the representatives of government and market entities support the goals of the institutions on the village level e.g., by providing training and resources. (4) The annual 'musrembang' is a participatory planning mechanism, which allows

introducing the locally developed projects into formal planning procedures so that they are accounted for in budgets and short-, midterm, and long-term plans. Ideally, the organization also participates in the coordinating mechanisms set up by BRR (A) to share information about the project and hand-over processes.

Discussion

The appraisal of the changes that occurred after the disaster in different activity fields showed that positive changes were occurring, addressing different dimensions of sustainability. Nevertheless, despite these positive developments, the collective impact of these changes was not as deep as they might have been because of constraining or unsupportive contextual aspects (see section 3), in particular the change in political leadership, which discontinued pilot projects and constrained sustainability plans. Nevertheless, this does not mean that Aceh missed opportunities for change towards sustainability entirely. Rather, it succeeded in some, failed in others, and is in a process of continual transitioning. Table 3 presents some examples of changes that illustrate the different types of sustainability outcomes resulting from people's efforts to seize windows of opportunity for change towards sustainability during disaster recovery. Responses indicated that seizing opportunities resulted in more than binary outcomes. Thus, I distinguish between four types of sustainability outcomes, starting with sustainability being implemented. Second, in some instances, efforts to seize opportunities for sustainability failed initially, but the same actor group or another group picked up the work and continued to pursue their sustainability change initiatives. Third, while initial efforts failed, people resolved to hold on to their vision of sustainability and

fourth, some efforts failed and ended. The second axis of the typology represents types of

opportunities: were opportunities for change leveraged to enhance sustainability (e.g.,

outcomes are available for broader populations and long term) or to improve disaster

recovery (e.g., outcomes are available for disaster-affected populations, mostly during

disaster times)? Distinguishing between these two opportunity types does not imply that

they are extensive representations of opportunity types or mutually exclusive. On the

contrary, they might well work synergistically together when this option is being

conceived of.[24] The examples in bold font in the table will be discussed below. The

asterisk (*) indicates changes towards sustainability, which serve as essential foundation

for sustainability, yet their current shortcomings require improvement and reform in order

to advance sustainability (c.f., Shah & Lopes Cardozo, 2014).

Table 5

Overview Of Types of Opportunities Seized and Types of Sustainability Outcomes

Generated for Diverse Daily Activity Fields

Opportunity → Sustainability ê	To enhance sustainability	To improve disaster recovery
is implemented	**Mental health care approach viable also for developing countries [Ca]** Peace [G], Health Care [Ca], Education [E]*	**Green construction guidelines for disaster recovery [H, W]** Disaster Management Institutions, focusing on risk reduction, in Indonesia [Ca, G]
is being pursued	**Transfer of Governance models [G]** Failure to invest in public	**Government decree on community-based housing reconstruction [H, W]**

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[24] This research did not yet sufficiently explore the synergetic relationships between these two.

	transportation during recovery; today Banda Aceh implements pilot for public bus system [M]	Retrofitting of failed livelihood programs and repair of houses [W, H]
remains a vision	Active civil society and Sustainability Caucus Aceh [G] Intergenerational and inter-cultural exchange and civic leadership programs for youth to build peaceful society [E, G]	Ethical standards for communicating about disasters to be adopted broadly [Co]
is ended	Lack of pedestrian friendly urban design [H] New spatial plan works against goals of forest protection [W, H, R, Ca]	Equitable treatment of tsunami- and conflict survivors [G] Women's organizations work with religious leaders to reconcile sharia law with women's circumstances [Ws]

There is evidence that some positive changes translated into institutions and physical infrastructures advancing sustainability. Consider for instance Aceh's progress in mental health. Treating traumatized people after a disaster is the conventional approach to disaster recovery. In contrast, leveraging the disaster for sustainability uses disaster funds to build capacity and infrastructure to treat mentally ill people: treating the people traumatized by the disaster and continuing to maintain the built capacity and infrastructure to offer improved mental health service to all residents in normal times. Aceh is leading an emerging and globally promising approach in this area (Miller, 2012). While this intention was clearly declared for mental health from the outset of the disaster relief and recovery activities it emerged during the disaster recovery in other daily activity fields. For example, BRR developed governance models to enhance integrity, accountability, and transparency of the disaster recovery governance in Aceh. Today, these models are adopted, guiding governance e.g., within the President's Delivery Unit

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for Development Monitoring and Oversight, the National Disaster Management Agency, and some agencies in Aceh and the City of Banda Aceh.

There is also evidence of positive changes that occurred during the Aceh disaster recovery and failed to translate into institutions and infrastructures in Aceh. Yet, they hold potential to generate future improvements of disaster recovery processes elsewhere as the failures in Aceh prompted some organizations to explore how to improve change mechanisms. An example where the Aceh experience triggered learning that improves sustainability aspects of disaster recovery process relates to housing. In light of the rapid and massive diminution of the primary forest in Aceh, the American Red Cross and the WWF developed a "Green Recovery and Reconstruction Toolkit" to improve the environmental performance during the Aceh disaster recovery. While only few organizations in Aceh changed course and applied them, some observe that this practice has since been adopted in other disaster-affected places (Frimmer, 2015). Nevertheless, the important step still needs to be taken, which means upgrading such voluntary guidelines into policies for reconstructing destroyed houses during disaster times, while finding ways to transfer these policies also into normal times. An example where this succession is partly happening pertains to the community-based and owner-driven approaches for reconstructing houses, which aimed at making disaster governance more inclusive, equitable and transparent. These approaches were promoted in Aceh to address the problems resulting from insufficient social processes related to housing reconstructing. They have since been applied in subsequent disaster recovery efforts, with each application generating lessons learned that increased the effectiveness of the approach. Today, community-based and owner-driven approaches to disaster

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reconstruction of housing are codified in a decree of the Government of Indonesia restricting contractors' and regulating NGO's role.

A third type of outcomes resulting from people's efforts to seize post-disaster windows of opportunity for change towards sustainability are those that have yet to manifest in formal institutions and infrastructures. In this case, change towards sustainability was inspired and informed by the disaster as well as post-disaster recovery processes and continues to be pursued. Change towards sustainability exists mostly in form of a discourse (as a vision) in a political environment that holds the risk that any future sustainability oriented change may be stymied by the political processes. These processes need support, including through inter-organizational collaboration and research.

The ongoing efforts to pursue change towards sustainability indicate that people did not only see and seize opportunities immediately after the disaster in 2004. Many sustainability-oriented changes originated during the Aceh disaster recovery. They were enabled by the foundational opportunities related to ending conflict to build peace, reforming the Indonesian disaster management law to focus on disaster risk reduction, and BRR's innovations of governance to promote integrity and accountability of government. While some efforts resulted in positive outcomes in Aceh, others failed; of those some led to learning processes that generated positive outcomes later and elsewhere. Outcomes of efforts to leverage opportunities resulted in changes towards sustainability that persist in normal times and others that improve disaster recovery.

What then, are good practices for SCAs to see, seize and sustain changes towards sustainability? To answer this question, I reflected on the empirical findings (see fig. 4;

highlighted in italic in section 5.2.1) against similar literature of transformation in disaster, referring in particular to Solecki & Michaels, 1994; Miller, 2012; Westley et al., 2013; Epping-Jordan et al., 2015; Jackson et al., 2016.

Good practices for SCAs to see opportunities for change towards sustainability. Having the mindset to see opportunities for change towards sustainability despite the chaos (Epping-Jordan et al., 2015) and the willingness to take risks to try something new (Jackson et al., 2016), while convincing others to do so, too, (Westley et al., 2013), is broadly supported through the literature. This mindset involves elements of agency (e.g., optimism, self-esteem, innovative thinking, sense of self-efficacy), yet many of these elements are little understood as disaster research shifted only recently from a deficit-focus to one that includes assets of positive transformation (Brown & Westaway, 2011).

A deliberate focus on sustainability, or aspects thereof, was identified as driving factor by many SCAs. This was in contrast to the focus of most organizations in the disaster arena, which framed sustainability primarily in terms of longevity of their investment. The literature of transformation in disaster also rarely explicates their normative sustainability framework. They explain how positive change enhancing public goods came about in areas such as mental health (Epping-Jordan et al., 2015; Miller, 2012); general health promotion in disaster recovery (Jackson et al., 2016), social innovation in ecosystem management (Westley et al., 2013) and hazard mitigation (Solecki & Michaels, 1994); yet positive change is not explained related to a comprehensive set of sustainability principles. To support developing a sustainability-orientation, interview partners involved and not involved with sustainability efforts

during the disaster recovery reckoned that having examples of sustainability projects as well as exchanging knowledge and practices among disaster management and sustainable development teams (especially, when both work within the same organization), would be helpful to guide actions.

Most SCAs made it clear that their ability to see and subsequently seize opportunities stemmed in large parts from drawing on enabling social and work environments. Working in a region like Aceh, which was closed off for many years, it was crucial for several SCAs to draw on national or international networks in order to continuously access support in terms of knowledge, experience, and encouragement as well as using the organizations' support to add authority to their own claims. While the literature recognizes the role of social capital, the works reviewed here paid little attention to the question whether and how actors create their enabling environments, maybe because the leaders of the initiatives were senior, reflexively drawing on years of relationship building and experience. Nevertheless, Solecki & Michaels (1994) found that a prerequisite to seizing opportunities is to work with an organization that has institutional strength and flexibility in the first place.

Good practices for SCAs to seize opportunities for change. The SCAs stressed their need to prepare themselves in order to take advantage of opportunities and "be fast and make it fast" as the disaster arena is competitive. The literature on transformation in disaster echoes this need for preparing and mobilizing pre-event (Westley et al., 2013) but also after the event (Epping-Jordan et al., 2015) through activities that lay the groundwork for taking advantage of the opportunities, such as building networks, linking innovative ideas to support structures, and accounting for the social context and how it

might influence the ability to exploit opportunities (Solecki & Michaels, 1994). Miller (2012) also points out the role of envisioning alternatives and taking time to reflect on past mistakes and how to approach the development of a mental health system differently in Aceh compared to previous attempts elsewhere. In Aceh, many SCAs were first-timers and only few had a mentor with experience of leveraging disasters for change to sustainability. This process could be accelerated when preparedness for seizing opportunities for change towards sustainability would become a part of disaster preparedness in general (Schwab et al., 2014).

For many of the SCAs collaboration and coordination was an important element of their ability to seize opportunities and some of the SCAs even identified liaising as one of their core activities. The literature reviewed here recognizes the need for liaising; emphasizing the role of change agents in facilitating knowledge building for social innovation (Westley et al., 2013) and coordination across agencies and involvement of national professionals in program design and implementation (Epping-Jordan et al., 2015).

Seizing the opportunity is a process, rarely a one-time action, requiring vision, flexibility, and perseverance, which needs to be nurtured through social learning, and collaborative research can partly contribute to social learning (Westley et al., 2013). In Aceh, only few SCAs had the means to employ research collaborations such as the one discussed above between international aid organizations, the University of Bogor, and communities to help identify and plant the right type of mangroves to grow a productive (fisheries) and protective (waves) mangrove forest. Yet, those who did found it a promising practice. Going forward, this suggests that there is potential for researchers to

participate in this (political) space as participants in inclusive processes aiming to co-create forward-looking and workable solution approaches, and to sustain them through monitoring, evaluation, and identifying adjustments (Potvin et al., 2003; Pelling & Dill, 2010; Tschakert & Dietrich, 2010). A sustainability-oriented recovery should be based on a reflexive approach, using monitoring and evaluation to navigate towards desired sustainability outcomes (Guarnacci, 2012).

Good practices for SCAs to sustain changes. A practice used by several SCAs was to enhance available capacities and use existing resources. In Aceh, this practice was in contrast to approaches used by many organizations in the disaster arena introducing imported resources and capacities without developing existing assets and capacities in the first place. Many of these introductions started to wither away as external partners withdrew and traditional patterns resurfaced (Thorburn & Rochelle, 2014). Using strength- and asset-based approaches and providing appropriate training has long been recommended in disaster and development literature, yet it remains often overlooked in practice (Mathie & Cunningham, 2003; Schwab et al., 2014; Epping-Jordan et al., 2015, Jackson et al., 2016). Murthino et al. (2013) also argue that the source of funding matters for sustained success of a project. Funding that combines in-kind contributions and external funds supports motivation, participation, self-esteem and a sense of empowerment among local leaders and project participants. It supports "crowding-in" of efforts, which is necessary for sustained success.

In most cases, the SCAs using the practice of enhancing available capacities and using existing resources, also undertook efforts to foster social relationships, both relations that connect project participants with to each other (bridging capital) and those

that built connections across socio-economic divides to ensure project participants can access resources and contacts available through government and private markets (linking capital). This practice of building social capital to anchor initiatives on the ground and institutionally has long been recommended for sustainability-oriented recovery (Berke et al., 1993). Vallance (2011) also found that disaster affected communities often need initial external support in order to come together and actually get engaged in the first place (bridging capital) and in order to access resources, which they often don't know exist or have not had / don't have the means to access (linking capital).

Fostering social capital also helped these SCAs paving the way to prepare a successful hand-over of projects and assets from their organization into the management systems and accounting books of local and central government. This practice was in contrast to many other organizations in the disaster arena (Nazara & Resosudarmo, 2007). Paying more attention to the mechanisms for successful hand-over and social relations seems important, especially for areas like Aceh, which are still marked by high poverty rates, corruption and patronage; the latter two being aggravated through only partially successful integration of ex-combatants. When organizations, such as those of the SCAs, commit to a sustained intervention, this practice could also allow members of poor communities to co-create exit-strategies from dependency relationships, because bridging and linking capital improves their access to and participation in institutions (markets, networks, programs) as well as their capacity to negotiate their institutional landscape (Wood, 2003).

Many of the SCAs made clear that they use real-world pilots for learning and a variety of other reasons, including conflict resolution, building confidence and trust, and

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creating the buy-in necessary for transitioning a project into a long-term program or even daily practice. Experiential learning and learning from experiments are recognized as an effective practice for transitions to sustainability that start out as a niche development (Turnheim et al., 2015). In fact, they are found as crucial for "complex livelihood-vulnerability contexts," which characterize poor regions, including large parts of Aceh (Tschakert & Dietrich, 2010). Although there are legitimate reservations, experiments such as the community-based mental health care in Aceh, are called for because they seem "the only possible way to provide such care in poor countries" (Miller, 2012, p. 1297). Instead of shying away from them, carefully planned and supported experiments can serve as demonstration projects that offer proof of concept for bold visions, attract further support and funds, and catalyze community social learning (Epping-Jordan et al., 2015; Westley et al., 2013). Nevertheless, for Aceh, the challenge remains to scale the sustainability-oriented pilots; extending scope and impact across broader sections of the population and region.

One area for improvement for most SCAs is their ability to coordinate and collaborate more with each other, especially as the formal disaster reconstruction and rehabilitation winds down. During BRR's reconstruction and rehabilitation phase easy access to funding and lack of requirements to contribute to "collective impact" (Kania & Kramer, 2011) encouraged individualized approaches, or "crowding-out" of action. Now, as funding dried up and became more competitive it may incentivize collective action or "crowding-in" (Murthino et al., 2013).

To sum up, related to good practices of SCAs, the study supports the factors that are recognized in the literature on transformation during disasters, such as the ability to

see and prepare for windows of opportunity and the need for SCAs to interact with the broader social and political context as well as with each other in order to sustain change, because windows of opportunity and SCAs are only 'a necessary but insufficient ingredient to advance change' (Solecki & Michaels, 1994). The study also provides some evidence for factors that are less mentioned such as SCAs knowing about sustainability examples and deliberately looking for opportunities to leverage sustainability during post-disaster processes.

The results of this study are indications, not yet solid findings, as the study has some limitations. First, given the disaster arena with thousands of actors, it was hard to find all the Sustainability Change Agents within three months. The snowball approach led to a broad survey of initiatives, at the expense of an in-depth analysis of each. Due to limited memory recall, it was hard for interviewees to reconstruct timelines, pathways, and the intersections across initiatives; therefore, causal relationships among initiatives, their sustainability outcomes and SCAs tactics are lacking. Lastly, the study lacked a collaborative research design: while I presented initial results from fieldwork and discussed these insights with people involved in disaster recovery, such engagement should have happened early on and throughout the fieldwork. This would have allowed combining an extractive and retrospective approach (interviews about past efforts) with a constructive and collaborative approach that is responsive to current needs and forward-looking.

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Conclusion

Despite the research's limitations, the study established that there are
Sustainability Change Agents (SCAs) working in disaster contexts and trying to leverage
the disaster in the pursuit of change towards sustainability. They may have been few but
with the support of an enabling environment, they emanated from diverse walks of life:
rich and poor, young and old, women and men. Depending on their societal position and
reach of their networks, the effects of their change actions and resulting sustainability
outcomes were larger or smaller. Moreover, current attempts on behalf of some SCAs to
foster networks and coalitions could result in resources that strengthen these small-scale
and bottom up sustainability initiatives, which is important as sustainability in Aceh now
inches forward at best. Any step towards sustainability is at risk to be stymied by adverse
contextual factors, such as the political leadership, Indonesian policies (e.g., cheaply
available consumer credits), and agreements about natural resource exploitation between
Acehnese and Indonesian governments and international investors.

The discussion about good SCA practices assumes that more can be done to
support their efforts and their emergence as leaders. One starting point relates to
educators and researchers. Opportunities for an educational approach have been
identified and outlined in Brundiers (2016). Researchers have started to provide case
studies on efforts to leverage disasters as opportunities for change towards sustainability.
However, more case studies are needed to engage in comparative and meta-analysis
necessary to synthesize relevant factors. Another approach relates to practitioners to carry
the conversation about SCAs into disaster risk management circles. My own experience
of sharing the insights about SCAs and their work at meetings in Jakarta and Banda

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Aceh, Indonesia, and Christchurch, NZ, indicates that the role of SCAs resonates with practitioners and active community members. It gives a name to an emerging community of practice and inspires thinking how research and practice can work together to create enabling environments for SCAs before and after disasters. This approach requires that researchers engage in different type of research, adopting a more active role that supports practitioners' along the phases of seeing, seizing and sustaining change by providing critical but constructive research.

Nevertheless, even many and well-trained SCAs cannot do magic to advance sustainability. They are embedded within broader cultural, economic, and environmental change processes, which occur in local, domestic, and international spheres. The dynamics of these processes constrain bottom-up sustainability efforts (e.g., insufficient peace building left social legacies that change slowly) and offer opportunities to work synergistically (e.g., smallholders engaging with international sustainable coffee markets). The question is whether SCAs can see and seize the synergistic opportunities provided by these broader change processes (not only those opportunities created by disaster) and leverage them to sustain sustainability efforts despite unsupportive local contexts. More broadly, the Aceh disaster recovery experience is another critical reminder to address compounded disasters (e.g., tsunami and conflict) equally and in connection to development processes; as the disaster is as much an expression of place as of broader change processes.

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DISASTERS AS OPPORTUNITIES FOR SUSTAINABILITY: THE CASE OF CHRISTCHURCH, NEW ZEALAND

Abstract

Sustainability challenges are accelerating, while human and institutional responses to these challenges are slow to emerge and to gain traction. Disturbance and crisis are mechanisms accelerating systemic change, and disasters in particular, are identified as catalysts. Two broad types have been observed: change processes that resulted in reinforcing pre-disaster resource exploitation and inequities, and those that introduced alternative pathways guided by sustainability visions. A variety of studies document mechanisms for the former; yet, only few studies empirically investigated how people were able to leverage disasters for change towards sustainability. While disasters create opportunities, seeing and seizing such opportunities and finding ways to sustain introduced efforts over time are matters of human agency. Therefore, this study is concerned with learning from those people and their organizations that were able to leverage disaster and advance sustainability. I use the term "Sustainability Change Agents" (SCAs) as shorthand to describe these people and their practices. The objective of the study is to identify effective practices used by Sustainability Change Agents. Therefore, the study asks two questions. First, what are the changes occurring post-disaster in different fields of daily activity, such as housing, working, recreating, caring, and so forth; and how does each of these changes contribute to sustainability? Second, what attributes characterizes the people pursuing positive change, increasing sustainability, and their practices? The study primarily draws on data generated through semi-structured interviews with SCAs over three-months of fieldwork in Christchurch,

NZ. Accounting for the perception of SCAs is essential as it motivates and guides their actions to direct change over time. The city of Christchurch was selected because its disaster recovery from the devastating series of earthquakes (2010-2012) is controversial. While the early times of the disaster recovery produced various ideas and efforts to seize opportunities for sustainability, some find now that more sustainability opportunities were missed than seized. The study finds that progress towards sustainability is mixed; yet the change processes are ongoing. While Christchurch was less successful in leveraging the immediate window of opportunity and introducing sweeping change towards sustainability, the SCAs, in collaboration with other actors, continued to see and seize opportunities opening during the disaster recovery process in order to move sustainability forward. An important element of the SCAs' ability to carry change forward includes their ability to sustain themselves and the people enrolled in the change processes.

Introduction

It is now well recognized that disasters and post-disaster recovery processes provide windows of opportunity for change (Pelling & Dill, 2010; Birkmann et al., 2009). However, human agency is needed to recognize such windows of opportunities and leverage them. The majority of studies on seizing windows of opportunity document change that benefits select interest groups at the expense of the greater good (e.g., Gotham & Greenburg, 2014, Gunewardena & Schuller, 2008; Klein 2007). Only a few studies document how individuals and organizations seized windows of opportunity to pursue the greater good, i.e. social cohesion and justice, renewable energy and resource-

efficient construction, or integrated livelihoods (e.g., Solnit, 2009; McSweeney & Coomes, 2011; Swearingen-White, 2010). Investigating the "positive side of disaster" supports communities in how to utilize disastrous events to pursue and make progress towards sustainability (Agrawal, 2011).

The city of Christchurch in New Zealand is one of the cases, where various groups desired to seize opportunities for change towards sustainability, including civil society groups, businesses, and government entities. For instance, the newly elected city council publicly committed to advancing sustainability after the series of earthquakes 2010-12. After more than five years of recovery efforts, a controversial question is: Did Christchurch seize the opportunity for change towards sustainability, or did it miss it? As there are contrasting and antagonistic perspectives on the direction of change ranging from a primary focus on economic growth to community resilience and sustainability, answering this question is crucial because it will shape people's outlook and future opportunities for the remaining and longest recovery phase, the "Regeneration Phase." Furthermore, shedding light on this question comes at a critical time for Christ¬church as some institutional arrangements between central and local government are redefined. Considering the tension between opportunities missed and seized during the Christchurch disaster recovery after the 2010-2012 earthquakes, this article asks: (1) What changes towards sustainability occurred and to what extent did they contribute to sustainability? (2) What opportunities were pursued to leverage change towards sustainability? (3) How did people and organizations leverage the window of opportunity created by the disaster in efforts to advance change towards sustainability?

The study aims to learn how change towards sustainability can be strengthened in Christchurch moving forward and in other places affected by disaster, where sustainability efforts will encounter similar antagonistic relationships.

Research Design

To identify and analyze the attributes of people who are able to perceive and pursue change towards sustainability in the midst of disaster, I developed a theoretical framework, which synthesizes literature from disaster research and sustainability science (Brundiers, 2016). The framework draws on conceptualizations of change in disaster, such as the pressure-release model (Wisner et al., 2004) and notions of windows of opportunity (Birkmann et al., 2009; Pelling & Dill, 2010, Westley et al., 2013), and brings attention to the role of context in influencing change processes, distinguishing between pre-disaster, disaster, and post-disaster contexts. Conceptualizing change towards sustainability, the framework draws on concepts such as transformative agency of individual actors, and how actors work together in transition arenas or shadow networks, respectively (Loorbach, 2010; Olsson et al., 2006; Westley et al., 2013). It recognizes the need to design and adaptively navigate long-term pathways towards sustainability outcomes, using iterative decision cycles, considering the complexities and uncertainties around future developments (Wise et al., 2014). The framework adopts a normative and solution-oriented perspective from sustainability science as it primarily focuses on understanding how people are able to pursue change towards sustainability (c.f., Gibson, 2006; Sarewitz et al., 2012; Miller et al., 2014).

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The application of the framework starts with identifying change processes and documenting these changes in relation to daily activity fields, i.e., changes affecting housing, working, educating, eating, shopping, recreating, worshipping, engaging, caring, communicating and being mobile.[25] These daily activity fields represent actions and behaviors executed during a regular day of most individuals (Kahneman et al., 2004; Forrest & Wiek, 2014). In carrying out their activities, people recursively draw on structures (physical infrastructure and institutions, including formal and informal rules) either confirming or altering these structures (Giddens, 1984). Thus, through the lens of people pursuing their daily activities, this approach also accounts for institutions and infrastructures. The use of daily activity fields to document change towards sustainability helps ensure that the appraisal of change is grounded in people's everyday experiences and is as comprehensive as possible; because sustainability, too, is a holistic concept about a way of being (Awotona & Donlan, 2008). The second step of the framework is to appraise the direction of change using a set of sustainability criteria, derived from sustainability principles and adapted to a disaster recovery context (Gibson, 2006). This step appraises whether a sustainability initiative contributes to enhancing sustainability (positive change) or decreasing sustainability (negative change). Against this background, the processes and actions employed by those people involved in advocating

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[25] Caring includes caring for people and for the environment. In Māori culture people are the land and the land are people; this also translated into law, with e.g., river systems being legally defined as a person (Rousseau, 2016). This research does not sufficiently address the fields of shopping and worshipping as they were less emphasized in the interviews. Yet, later in learned that various positive changes occurred in the field of worshipping. It is a shortcoming of the snowball approach that this field is insufficiently represented in this study.

for sustainability changes can be reconstructed. This third step also accounts for the role

of context in constraining or enabling these people's actions.

The research centers on fieldwork in Christchurch, New Zealand from January to

April 2015, which was complemented by a literature review. Fieldwork included 60

semi-structured interviews, 46 of them involved people directly leading sustainability

initiatives, 16 site-visits (including volunteering and attending public events) and five

public engagement events offering opportunities to discuss emerging research insights.

Contacts were identified through the snowball method, accounting for initiatives in

public, private and the third sector as well as across a diversity of daily activity fields.[26]

Also, I accounted for initiatives that pursued select sustainability goals (e.g., health,

democratic governance, renewable energy) or comprehensive notions of sustainability in

terms of meeting the challenge to provide "decent livelihoods for all without wrecking

the planet" (Gibson, 2006, p. 171). I use the term Sustainability Change Agents (SCAs)

as shorthand to refer to the leaders of sustainability initiatives that attempted to leverage

the post-disaster situation to advance sustainability. Table 6 presents the diversity of

SCAs involved in this research (N=46) in terms of stakeholder types, age and gender and

the primary focus of their change initiatives related to targeted daily activity fields and

sustainability principles.[27]

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[26] Third Sector Organizations is the term used in New Zealand to describe those organizations that are neither statutory nor commercial entities; they include non-for-profit and non-governmental as well as civil society organizations.

[27] Note this table is not the result of a self-reported description of the SCAs by interview respondents. I created this table based on my interpretation of the interview data after returning from fieldwork.

Table 6

Overview Of Some Characteristics of the Sustainability Change Agents Involved In This Research

Gender	Female	Male						
	46%	54%						
Age cohor	Junior	Senior	Retired					
	28%	70%	2%					
Stakeholder types	Local NGOS	Nat Gov	District Gov:	Local Gov	Private Sector	Research	Combinations	
	35%	11%	9%	13%	13%	13%	6%	
Daily Activity Field	Caring	Engaging	Housing	Educating	Mobility	Working	Communicating	Eating
	22%	39%	11%	9%	7%	4%	4%	4%
Sustainability principles	Social Wellbeing	Sustainability	Livelihood & Public Finance	Nat Env	Adaptability			
	46%	30%	13%	7%	4%			

The answers to the research questions are primarily based on comments of respondents, as their expert interpretation of developments is essential. I justify this approach as follows. Little is known about those *actors* who advance change towards sustainability in disaster times and what *practices* they use for these pursuits. Transition literature postulates that, for initiatives starting at a micro-scale, as was the case for many sustainability-oriented initiatives in Christchurch, the "motives and strategies of actors on the ground are critical to making transitions socially-robust and sustainable" because these on-the-ground-actors are majorly involved in defining and legitimizing new practices (Turnheim et al., 2015, p. 244). In this process, the actors' rationality in decision-making is bounded by their circumstances and resource constraints (Simon, 1957), drawing attention to the influencing role of context on actors' practices. Institutionalizing new practices previously employed only by a small group and on a niche level implicitly requires that Sustainability Change Agents are able to work with others, including supporters, opponents and across different levels of governance, as well as with the constituencies of their sustainability initiatives (Fischer & Newig, 2016). Hence, the reported perspectives of SCAs indirectly reflect the perspectives of these

related groups and the influencing features of the context, within which the SCAs are embedded. In Christchurch, the perspective of the SCAs is especially relevant as the diverse sustainability initiatives can be conceptualized as pushing back against the neoliberal policies implemented by central government over the past years. The disaster governance arrangements further accentuated neoliberal processes with central government curtailing local democracy institutions. Furthermore, and public and private insurance organizations were influencing reconstruction as they were financing 73% of disaster repairs and rebuilds (Hayward & Cretney, 2014; Deloitte, 2015). Lastly, a focus on the SCAs' perspective is also justified as this research is primarily interested in understanding the processes and perceived directions of change and less in the actual assessment of sustainability at a specific point of time.

The research received approval by the institutional review board at Arizona State University.

Case Study: Contextual Challenges For Seizing Windows Of Opportunity

On 4 September 2010 the first earthquake (magnitude 7.1) rocked the greater Christchurch area. It was followed by a series of damaging earthquakes and more than 12,000 aftershocks from 2010-2012. The earthquake occurring on 22 February 2011 (magnitude 6.3) is considered to be the most devastating and deadly peacetime disaster in New Zealand. The earthquake and the soil liquefaction that accompanied it caused widespread damage across Christchurch, especially in the central city and eastern suburbs (CERA 2012a). It resulted in a dramatic loss of 185 lives, traumatic injuries, and

destructing houses, businesses, schools, churches, recreational facilities, infrastructures, ecosystems, as well as the Māori's settlements and places of community gatherings.

In this section, I describe the pre-disaster, disaster impact and post-disaster contexts from the perspective of the SCAs I interviewed. Their interpretation of these contexts affected how they pursued opportunities for sustainability and how they understood the effectiveness of their actions. Due to space limitations I present select aspects of these three contexts, focusing on aspects that respondents saw as hindering their work to advance sustainability.

Pre-disaster situation: Some of the issues that made Christchurch, in the words of one interviewee, one of the "most political disasters" (CC_47) have their origins in the pre-disaster context. Many interview respondents perceived themselves working in a context where the incumbent central government, led by a center-right party, expanded neoliberal approaches to economic development and chiseled away democratic practices. Neoliberal traditions in New Zealand were accentuated when the National Party gained victory and has since been re-elected in 2011 and 2014. Jones (2016) describes the hegemony of capitalism in New Zealand as a process where the logic of money drives policy decisions and "seeks to code life in the terms of finance." He sees it as a process that generates an emerging resistance from below. On average, however, the impact of these neoliberal policies on public attitudes towards social citizenship is mixed: New Zealanders now prefer tax cuts over income redistribution and wage controls, but are not willing to sacrifice social spending on health, education and targeted social assistance (Humpage, 2011). Democratic practices relating to governing highly contested resources such as water have been curtailed, as central government suspended regional government

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elections and appointed expert commissioners, doing so despite local and legal objections (Hayward & Cretney, 2014). Moreover, several respondents, ranging from political leaders in city government to leaders of neighborhood groups, remarked how their sustainability-related work was impacted because central government took the word sustainability out of key documents, replacing it with resilience (CC_50).

Many interviewees also felt compelled to take actions because they perceived that locally a rich-poor divide characterized the city and a housing crisis was already manifest (CC_56; McCrone, 2013). As the central government left housing provisioning to market forces, finding affordable and safe housing, in particular rental housing, was difficult post-disaster, especially for vulnerable populations (Howden-Chapman et al., 2014, Hayward, 2013).

The long-standing inequalities were further aggravated through cuts in government funding to social service providers who were responsible for contributing in major ways to mental and physical well-being in New Zealand; many of them operating as Third Sector Organizations (Horn et al., 2015).[28] The spending cuts increased competition for scarce resources and pressured social service providers to reorganize in order to meet funders' increased performance expectations (CC_54). Post-disaster, the role of Third Sector Organizations increased further. Carlton and Vallance (2013) counted almost thousands of community-groups and initiatives that developed or evolved as a result of the earthquakes, inventoring 450 of them in detail.

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[28] For instance in 2005 there were some 97,000 Third Sector Organizations active in New Zealand contributing between NZ$ 7-10 billion to the national economy, while 90% of these organizations had no paid staff (Horn et al., 2015).

At the time, available information about hazards and associated risks suggested that "the big one" was supposed to happen in Wellington rather than Christchurch (more than 300 km away). Other scholars have suggested that this belief contributed to the fact that Christchurch had no effective plans in place, was lax in requesting buildings to be strengthened, and reduced its insurance premium (Sheppard, 2014). There were some efforts to enhance sustainability, however. For example, the reform of the Civil Defense and Emergency Management Act 2002 included sustainability principles and devolution of power. One respondent, who was involved in this process, remarked that the subsidiary boards were reluctant to take on such responsibility and re-delegated some power back to the crown (CC_2).

Disaster situation: The first earthquake occurred on September 4, 2010 (Magnitude 7.1). Yet it was the second major earthquake on February 22, 2011 that completely altered the face of the city (Magnitude 6.3). Rock-falls and subsidence changed the geology, topography and ecosystems in greater Christchurch and liquefaction inundated many suburbs. Particularly affected were the low-income communities in East Christchurch and affluent coastal and hill suburbs of Sumner and Mount Pleasant (Hayward & Cretney, 2014). Impacts of the earthquakes also resulted in the designation of a "Residential Red Zone," requiring the residents of this large stretch of land to abandon their homes. Almost 8000 properties needed to be demolished and their inhabitants relocated, using an offer from the crown to help them move elsewhere (Toomley, 2012). The downtown Christchurch area had to be evacuated and was cordoned off for more than a year. About 80% of its building stock was deemed unsafe and subject to complete demolition (Stevenson et al., 2014). The downtown cordon

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combined with the destroyed road system around town was one of the factors that contributed to an immediate movement of people and enterprises to the North and West of town. It altered travel patterns and transportation modes, causing passenger losses in public transport (Koorey, 2014). The series of 59 earthquakes of magnitude 5 or more and over 3800 aftershocks of magnitude 3 or greater between September 2010 and September 2012 slowed down reconstruction activities and added mental stress to residents, as indicated by highest levels on record of stress-related depression and domestic violence at the time (Hayward, 2013 p. 1).

Disaster recovery: The scope of destruction of the most devastating February 2011 event led to a government call for a "State of national emergency," which prompted the intervention of the central government, the establishing of the Canterbury Earthquake Recover Agency (CERA) and the issuing of the Canterbury Earthquake Recovery Act 2011 (CER Act 2011). The CER Act provided, among others, for the Minister of the Canterbury Earthquake Recovery and CERA to direct recovery planning to ensure disaster recovery as well as to restore wellbeing of communities and enable their participation in recovery planning without impeding a "focused, timely, and expedited recovery" (Toomley, 2012). The CERA Recovery Strategy was one of the foundational planning instruments, from which a suite of guiding documents emanated. The CER Act 2011 was widely contested as it granted special, war-like powers with little constraint and oversight to the Minister in order to advance disaster recovery. Toomley (2012) describes how the CER Act directly relates also to sustainability as the act empowered the Minister to "suspend, cancel, amend or revoke wholes or parts of Resource Management Act [RMA] documents." This stripped a "fundamental environmental and planning

legislation" of its powers: considering that the RMA from 1991 has been described as "the first in the world to internalize the concept of sustainability as a defined and enforceable core obligation within a comprehensive integrated resource management structure" (Toomley, 2012, p. 14). Thus, the provisions to support the disaster recovery came at the expense of suspending normal processes of local and national democracy and of supplanting local planning and political decision-making structures by CERA's appointed staff and processes (Hayward & Cretney, 2014).[29] Using his powers, the Minister allowed and accelerated changes of previously made planning arrangements, some of which directly relate to sustainability. For instance, Hayward and Cretney (2014) describe how central government overrode the award winning public consultation process "Share an Idea," which garnered 106,000 contributions for a sustainability vision for Christchurch and informed the Christchurch City Council's draft for rebuilding the city (Schwab et al., 2014), through the "blueprint." The blueprint was produced primarily by experts reporting to the Earthquake minister, with little local consultation, and replaced the replaced the city's draft recovery plan. Also, the Minister developed and implemented plans without accounting for the Urban Development Strategy, which the three neighboring district councils and other statutory partners had developed since 2007. Outcomes of this process included e.g., accelerated greenfield development, road-building and widening, and residential intensification, the latter occurring mostly in areas with pre-existing dense housing, while more affluent neighborhoods were spared intensification investments (Salmon, 2015).

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[29] CERA hired 400 staff and about 1027 consultants to work on the recovery strategy's 29 programs, entailing 116 projects.

With the end of CERA's term April 2016, the special powers granted for the recovery period were revisited and reassigned. With the beginning of the Regeneration Phase (see figure 8) two new recovery agencies have been instituted, Regenerate Christchurch and Development Christchurch Ltd. This phase will be the longest, calling for more stamina and vision on behalf of various local leaders in Christchurch, at a time where many of them feel strongly disillusioned about prospects for change towards sustainability.

| CERA + CER Act | Crown + New Act + Local Entities | Normalized local leadership |

Emergency   **Restoration**   **Regeneration**   **Vision**

Time of Research

2011	2013	2015	2016	2017	2018	2019	2021	2023	2026	2040+
		Years 3-7 are the most difficult years of psychosocial recovery				Anchor projects completed				
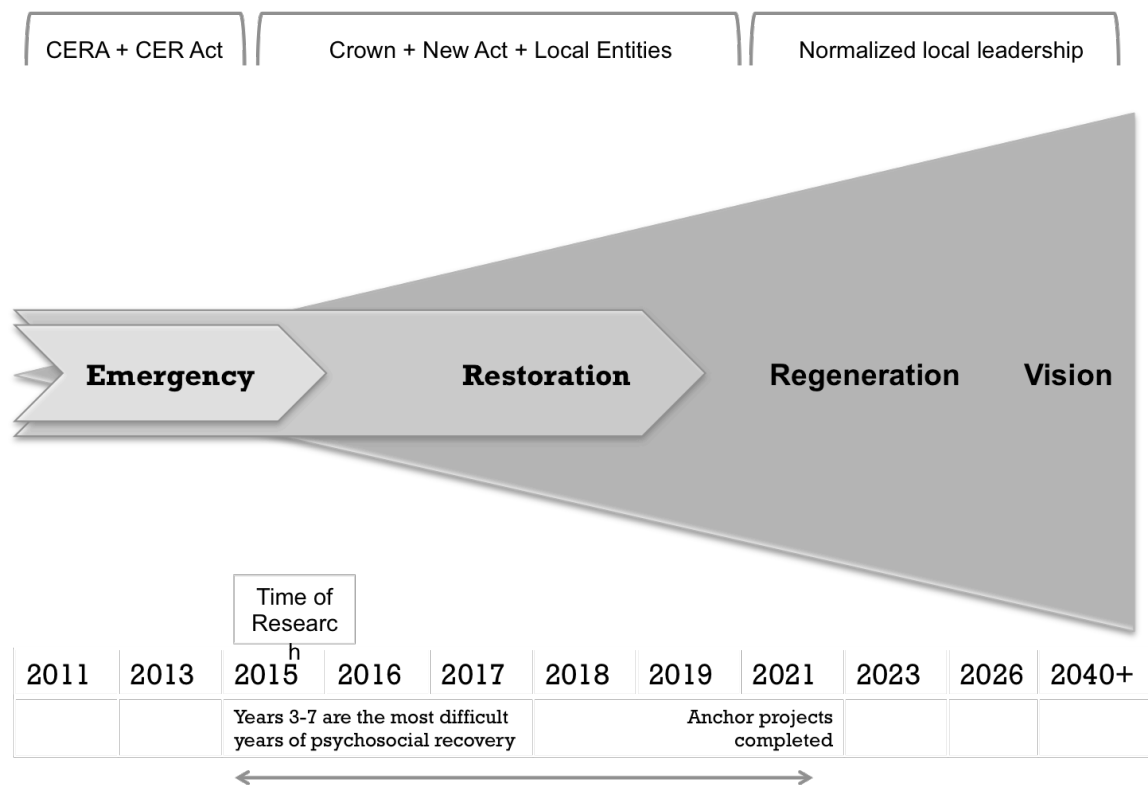
Figure 8. Disaster recovery phases of the Canterbury Earthquake Recovery Authority. (Adapted and simplified figure from Ombler (2015)).

The scope of destruction made the events in Christchurch the 5th biggest liability event in the insurances' world history (Deloitte, 2014). Private and central government insurances paid about 73% of the repair and rebuilding activities of buildings and land. Globally, this is the greatest percentage compared to other top insured loss events from 1980-2012 (Deloitte, 2014:13, citing Munich Re, 2014). This helps explain why the public discourse framed the approach to disaster recovery as an "insurance-led" and "free-market" approach (The Press, July 27, 2011). The mismatch between the complexity of the insurance issues and the available capacity at the time within government and private insurance entities, were both largely unprepared to pay for a series of events occurring across a whole region, to handle claims created subsequent problems, including delays in repairs and rebuilding, financial hardship and mental health issues of some policy holders, and litigation (Toomey, 2012). Several interviewees commented that the insurance-led process also contributed to social divisions. For instance, one interview respondent, who helped launch an advocacy group for insurance holders, observed that as insurance claims were handled on an individual basis, the neighborhoods, brought together through the shared earthquake experience, were again torn apart (CC_42). This individual approach also stifled the pioneering attempts of a newly emerged collective of homeowners who wanted to rebuild their houses as shared properties as one of the leaders involved in this initiative reported (CC_61). More generally, the insurance policy of rebuilding and repairing "like-for-like" hindered sustainable reconstruction of buildings along green building guidelines as implementing energy efficient systems, insulation, or sustainable materials had to be paid through owners; they were not covered through the insurance policy (CC_10). Rebuilding "like-

for-like" to pre-disaster levels was also the primary objective for restoring the horizontal infrastructure including wastewater, water supply, storm water and road networks. Betterment, in terms of increased resiliency to seismic hazards, could be considered if the case could be made it was "reasonable" and "economically feasible" (MacAskill, 2014).

Lastly, the rebuild activities themselves created problems. For instance, the CERA's recovery plan, the Blueprint pursued a recovery plan centered around 18 anchor projects or precincts, including large scale cultural, sports, and event facilities; urban housing demonstration projects; public services buildings related to health, justice, and emergency management; and green space developments around the Avon Otakaro River and the areas that frame the east and south side of the inner city (Cera, 2012b). This approach was critiqued for a variety of reasons including e.g., its large scale, top-down approach that left little room for a bottom-up, organic growth of urban spaces (Bennett et al., 2014). Furthermore, the plan required the Crown to purchase 761 private ownership lots, mostly through gradual small-scale acquisition, and led to the Crown issuing a notice to expropriate the land (Toomley, 2012).

The city found itself in financial dire straits with a budget crisis that was exacerbated by the disaster because post-disaster, the city had "overpromised and under-budgeted" related to the disaster recovery efforts (CC_33). And there was a public outcry about the lack of attention given to the divergent needs of societal groups and the inequitable distribution of costs and benefits of the recovery process (The Press, 2015, May 16).

Figure 9. Psychosocial Wellbeing Graph. (Source: Holyan et al. (2011)

In summary, during the past five years, Christchurch experienced the high-peak of

the post-impact "honeymoon," which is locally dubbed as the "front-end of the

sustainability story," and "Share an Idea" is remembered as epitome of people's ability to

see opportunities for change towards sustainability. Since then, people worked through

the hard years of disillusionment; the "back-end of the sustainability story" (see figure 9).

Organizations and individuals have expended a lot of energy and hopes in their efforts to

push sustainability and rectify the wrongs created through the disaster recovery. In 2015,

many leaders of initiatives with sustainability-related goals feel exhausted, disillusioned,

and frustrated. They are fatigued and have reached a low point (c.f., Horn et al., 2015).

The public discourse around the sustainability story also is shaped by two recent

influential books that many residents and local leaders of Christchurch had found

resonated with their perspectives and experiences. Naomi Klein's book "The Shock-

Doctrine" is referenced frequently in published literature and in interviews with actors in Christchurch, particularly in relation to, for example, processes around relocating people from the residential red zone, the accelerated closure and merger of local state-owned schools, and the power bestowed on CERA and its Minister. Rebecca Solnit's book "A Paradise Built in Hell" is also often used in reference to the outcomes generated through community-based processes (c.f., Hayward, 2013; Vallance, 2012; The Christchurch Press: Aug, 4, 2011, Sept 8, 2012, and Nov 27, 2015; O'Steen & Power, 2016). Thus it is in this complex context of experience, discourse and political mobilization that the disaster occurred and recovery efforts were implemented.

Considering this adverse context, what were the changes that SCAs pursued and how did they contribute to change towards sustainability?

Findings

What changes towards sustainability occurred and to what extent did they contribute to sustainability? This section summarizes the sustainability appraisal of changes, referring to the main sustainability dimensions and related criteria. Table 1 (appendix) provides an overview of the sustainability criteria used for the appraisal. As explained above (research design section), the appraisal is mostly based on the impressions of the Sustainability Change Agents, as the SCAs' expert interpretation of development is essential. The interviewee source for each of the claims regarding sustainability outcomes is provided in parentheses following the statement. To underscore the subject matter expertise and insider knowledge held by the interview

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respondents concerning the issues appraised below, Table 2 (appendix) provides a list of the interviewees indicating their affiliation, position, and area of subject matter expertise.

Environmental dimensions of sustainability. The destruction caused by the earthquakes enabled some positive environmental changes in institutions and the built environment, resulting in long-term benefits. These include for example increased air quality due to rule changes pertaining to low-emission wood burners; expected increases in biodiversity as some urban, peri-urban, and coastal areas allowed to evolve into native ecosystems; and increased energy efficiency of buildings through improved designs and use of modern materials, insulation, and technology (e.g., ground-sourced heat pumps) (CC_34). Most interviewees pointed out that co-governance among Māori tribal council, city councils and CERA allowed that land-use and urban development plans were influenced by Māori values, which safeguard the environment and the people.[30] For instance, a manager of the Natural Environment Recovery Program explained how it works from an understanding of the natural environment to be the all-encompassing system, within which the social and economic systems are nested (CC_34). Meanwhile other plans pursue weaker notions of sustainability and their spatial scope is more limited, for instance, the inner city mobility plan "Accessible City" (CC_13) as well as the guidelines to develop nice, accessible, and people friendly inner city streets and places (CC_26). City council staff and their research counterparts at the University of Canterbury are confident that their program Greening the Greyfields will contribute to reducing environmental impacts as it aims to increase density in Christchurch's suburban

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[30] For details on this major achievement, review Kenney et al. (2015).

neighborhoods (CC_10, CC_29). Plans around a regional rail are discussed among the mayors of the three neighboring districts, which would reduce air pollution in the future (CC_49).

In contrast to these positive changes, increasing sustainability, there are negative changes, decreasing sustainability. A new Land Use Recovery Plan replaced parts of the regional Urban Development Strategy, allowing an accelerated, and in some areas increased, development of green-fields, at times in flood prone and peat land (Salmon, 2015). It was supposed to enhance density; instead it generated increases in air pollution due to traffic congestion (CC_34). Christchurch city staff members described how the city council's attempt to strengthen the city's building code was reversed by a Supreme Court ruling. Similarly, central government stopped city council's attempts to write sustainable housing standards into the city plan (CC_10). As for efficient use of construction material, it showed mixed results. Good waste management principles and planning were dropped for reasons of expediency forgoing the use of reclaimed material, as identified by a local waste management expert involved with the disaster recovery (CC_39). Local innovations of word-leading technologies and materials for wooden and solar construction, successfully employed abroad, were mostly disregarded while conditions would have been favorable; an observation shared independently by the funders and owners of these innovations (CC_12, CC_28). Actions reducing overall energy use and supporting renewable energy remain a subordinate approach. Energy was considered by national and local SCAs working in this field as the biggest opportunity and the area of least progress (CC_10, CC_18). Actions reducing overall water use and

increasing water quality are limited due to national legislation allowing further loss of water quality (CC_1).

Nevertheless, the environmental sustainability initiatives will continue and future plans are being prepared. For example, the Canterbury District Health Board is one of the committed champions investing in the implementation of a district-heating program in Christchurch to advance energy savings and renewable technology (CC_20). Municipal and national agencies partner to scale post-disaster pilots related to smart grids and sustainable housing across NZ (CC_10, CC_18); and some local solar companies gain traction (CC 36). To support efficient use of construction material in future disaster response processes, the NZ Ministry of Civil Defense & Emergency Management as well as disaster management agencies in Australia and elsewhere consider adopting proposed evidence-supported sustainable disaster waste management guidelines (CC_39). Some Third Sector Organizations worked successfully to establish a vision for the residential red zone, which would entail native forest for recreation, conservation zones and wetlands (CC_42). The future uses of the residential red zone, however, will be decided by the Minister of the earthquake recovery.

Social dimensions of sustainability. "Indescribable" progress has been made in terms of place making, which will shape Christchurch's identity: Māori culture, history, and values will be inscribed in the cityscape of the recovery's 18 anchor projects, representing biculturalism in a previously predominantly Anglican city (CC_35). Senior city council leadership reported that the success of the transitional city movement motivated city council to ensure that the activation of vacant lots, e.g. through using them temporarily for alternative civic purposes, urban gardening, and as office locations for

micro- and small enterprises, continues in order to support place-making in the city

(CC_50). Mayors and vice-mayors of Christchurch and Rangiora regard it as "extremely

important" that there are places for communities to build, interact, connect, and feel a

strong sense of place (CC_49; CC_58). Therefore, they seek to increase communal

gathering places in cafes, public libraries, schools, and other places. The rebuild of

Christchurch's Public Library, designed through a participatory process, which was

modeled after the award-winning processes used for "Share an Idea", created such a

public space and restored some trust in public engagement processes. Programs

effectively supporting psychosocial and physical healing from disaster trauma were

successfully co-created through collaboration among Third Sector Organizations,

Canterbury District Health Board, and CERA entities.[31] A member of CERA's

governance group reported how this collaboration led to develop a policy directive,

which requires any future policy development accounts for community resilience and

well-being and provides evidence supporting these accounts (CC_59). A coalition of

Third Sector Organizations emerged and secured a seat at the table of inter-governmental

planning groups within CERA and informed recovery plans and potentially the

implementation of the Urban Development Strategy. The formation of this coalition is

remarkable as the representative of the coalition noted, because Third Sector

Organizations "behave naturally mercurial" in normal times; working very independent

of each other (CC_7). In addition to these vertical collaborations, various Third Sector

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[31] These include for instance the CERA strategy called Community In Mind, a guiding document to ensure psychosocial needs across diverse communities are considered in the recovery and the contributing work of Third Sector Organizations can be realized (CERA, 2013); as well as a related project, the evidence-driven All Right? Campaign supporting mental health and wellbeing of Cantabrians through the recovery.

Organizations increased their horizontal collaboration with each other as part of the disaster response. They entered partnerships to provide effective and far-reaching support programs, as a member of such an association reported (CC_54). Her own organization joined such an alliance to provide integrated services on issues such as family violence and health care for low-income communities, which were aggravated because of the disaster and recovery experiences. The Canterbury Health District developed a professional education program for staff to build capacity for addressing long-term effects of post-disaster stress; and these consequences are starting to emerge now (CC_20; CC_21). Progress has also been made in terms of civic engagement and self-efficacy. As the recovery process constraint people's engagement in democratic institutions that were taken for granted, a groundswell of activities emerged that reclaimed democratic participation in governance and built capacity in people and organizations (C_55).[32] Voters elected a new city council in 2013, who delivered on campaign promises by opening options for participation, devolving decision making power to elected community boards, and increasing transparency and accountability by opening its books to consult with residents on how to address the budget deficit and long-term finances. Various interview respondents praised it as the "greenest ever" and "most generous and progressive council in terms of funding." (CC_46, CC_56, CC_57). As mentioned above, the Māori community mobilized; self-organizing an effective response and securing their role as statutory partner in disaster recovery (Kenney et al., 2015).

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[32] The inventory, produced by Carlton & Vallance (2013) capturing the rapid growth of Third Sector Organizations and community groups post-disaster.

Negative changes, decreasing sustainability, parallel the above achievements. Most importantly, a senior staff member of Christchurch city council noted, instead of increasing social cohesion, the socio-economic divide has deepened and some social service provision has been slow to emerge (e.g., social housing), further marginalizing formerly disadvantaged groups (CC_56). The rebuild is slow and the officially planned civic spaces are yet to come while the fight about some highly contested places is ongoing (e.g., Christchurch Cathedral) (Wright, 2016). The provision of high quality housing and land shows mixed results. The government-supported relocation of about 8000 properties (about 15,000 individuals) from the residential red zone to alternative communities showed mixed results. The Deloitte (2015) report indicates that the Christchurch situation reflects a privileged situation in an international comparison. Nevertheless, respondents working for public health services, law firms, and human rights groups highlight the hardships it caused (CC_9, CC_21); the process has since become subject of review through the Human Rights Commission[33]. Sustainability progress in housing was hampered by the insurance motto to rebuild and repair like-with-like, which hindered betterment and sustainability measures count as betterment (CC_10, CC_24). Furthermore, delayed actions to mitigate the housing crisis, which was aggravated through the disaster, hurt vulnerable groups, including mentally ill people (CC_21) and low-income families (CC_56). Yet, some positive changes increasing sustainability exist also in housing and hold potential for the future. On a very basic level, rebuilding with modern materials and increasing insulation have elevated the average

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[33] Human Rights Commission New Zealand: Canterbury Earthquake Recovery Reports: www.hrc.co.nz.

housing standard, which was below OECD average pre-disaster and a severe public health hazard, as reported by researchers and senior government officials (CC_29, CC_45). City council staff reported how the city advanced programs to support sustainable housing as well as the quality of rentals and continues to find effective ways to move these initiatives forward despite pushback from central government (CC_10). A variety of progressive sustainability housing initiatives emerged among Third Sector Organizations, Māori, and social enterprises. The latter inform not only local efforts, but also global developments because they are connected to an international network of social enterprises in sustainable housing and were recruited to advise mainstream developers and insurance companies on sustainable housing (CC_36). Social housing programs spearheaded by Third Sector Organizations on the ground (CC_56) and by agencies during the Cabinet Process (CC_21), are now also offered through city council (as public private partnerships), the national government, and local groups. Provision of public facilities and services: the horizontal infrastructure development, which also includes the "three waters" drinking, waste, and storm water, through the Stronger Christchurch Infrastructure Rebuild Team (SCIRT) shows mixed results (MacAskill, 2014). While SCIRT adhered to rebuilding like-for-like it found some ways to account for betterment. For instance, SCIRT chose materials that are more resilient and able to account for the anticipated population growth and it built more manholes for serviceability, which enhances the infrastructure's lifespan and reduces the amount of excavated soil that needs to be shipped to the landfill. SCIRT's communication and outreach efforts were widely appreciated efforts that were transparent and responsive to the affected communities (CC_24).

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Future potential to increase the social dimensions of sustainability exists. For instance, the quake experiences increased collaboration among diverse groups by necessity and temporarily fostered social cohesion (CC_8). Resurrecting the memory of these empathic disaster practices (CC_54), combined with the enhanced collaboration and city council's commitment to maintain funding levels for social purposes (CC_56), can provide levers for building social cohesion. Furthermore, the recognition of Third Sector Organizations as stakeholders and their inclusion in decision-making processes (on the local level) from the planning stages in deliberative not only consultative roles is a breakthrough (CC_38) and some council members consider it will stay (CC_33). As for public services around transportation: the opportunity to build infrastructure systems that keep the modal split and further promote public transport was lost as transportation was addressed separate from the recovery strategy. Nevertheless, the bus interchange and the council's recent commitment to investment in a comprehensive network of cycle ways attempt to remediate it (CC_13).

Economic dimensions of sustainability. As part of the recovery processes, the social enterprise movement and the creative economy took off in Christchurch and institutional structures were created in central government and among charitable funding organizations to support these livelihood options (CC_52). The rebuild of the horizontal infrastructure entailed new technologies and SCIRT provided for future and ongoing professional development and training of the municipal workforce (CC_24). Canterbury District Health Board, the biggest employer in the region, transformed the traditional and compartmentalized approach to Occupational Health & Safety into an encompassing and holistic well-being approach for its staff. As staff represents the community at large,

either in terms of clients or family members, this process led to re-thinking of societal well-being and subsequent investments to ensure sustained implementation. The local economy is somewhat strengthened. For instance, the new Health Precinct is expected to offer high skill, high value jobs; fostering innovation networks in the local economy (CC_20). The award-winning alliancing model of SCIRT had spread wealth among local and other contractors in contrast to monopolistic models used in the vertical rebuild (CC_55). Time-banks are operated through grassroots organizations (CC_1). The increasing role of the Māori tribal council as a major economic player in the South Island is also seen by a district council member as a driver that can strengthen the local economy in areas of housing, dairy and water (CC_49). Christchurch city council members noted that public finances were in disarray before the disaster. Moreover, the disaster related expenses, the cost-sharing agreement between the Crown and city council, and the city council being underinsured, increased the challenges for the city's finances to provide for the public good in the long run (CC_33). Nevertheless, the incumbent city council increased transparency and participation in fiscal matters and entered public-private partnerships to more effectively deliver public goods such as social housing (CC_56) and waste management (CC_39). Some disaster recovery funds considered long-term development, catalyzing sustainability initiatives such as sustainable housing enterprises (CC_52) and collaboration across social service providers on neighborhood levels to increase their ability to effect change in their area (CC_54).

Negative changes, decreasing sustainability, entail the brain drain of youth (CC_11) as well as the type of job growth expected to result from the blueprint's anchor projects (CC_58). Aside from employment options for civil servants in buildings

occupied by central government, some anchor projects (e.g., stadium, convention and metro sports center) are expected to offer mostly low-skill and low-paying jobs in areas such as food outlets, retail, and cleaning (CC_1). The recovery process weakened the local economy in the downtown area (Wright, 2016). The long period during which the city center was cordoned off forced businesses to move elsewhere. Now, the inner city is not affordable for many local (small) enterprises and the tendering processes are too complex for them to participate, as one respondent, presenting a group of small businesses reported (CC_40).

Future potential to increase the economic dimensions of sustainability exists and can serve as a springboard to build upon. For one, Christchurch city council staff work on specifying visions to develop a local green economy driven by existing producers of alternative energy (e.g., biomass, landfill gas, solar). Also, developing an alternative currency and expand time-banking models will alleviate municipal budget constraints and cash-strapped residents; this process is advanced by local groups, such as Project Lyttleton and supported through some council members (CC_33). A better integration of the interactions between city and region is sought in order to strengthen the local economy, and related partnerships have been fostered, as reported by a newly appointed member of these renewed partnerships (CC_38).

Cross-cutting sustainability dimensions: equity/equality and adaptability. The above interview respondents suggest that social justice issues were rather aggravated than resolved during the disaster recovery; in response various initiatives advocated for intra- and inter-generational justice. For instance, the human rights commission evaluated recovery activities and recommended actions to rectify them; the health sector invested in

building its capacity to treat chronic issues from the disaster; and the city consulted with the public on how to resolve the budget deficit over the long-term. The inter-regional collaboration among district governments on regional land-use development plans is seen broadly a vehicle to address justice issues among functionally linked groups across regions and the inclusion of representatives of Third Sector Organizations will help to consider the perspective of vulnerable populations in this process (CC_1, CC_54).

Emerging social justice issues with longer-term implications include for instance the situation that some communities, especially on the East side of greater Christchurch who suffered severe impacts from the earthquakes and are home to lower-income communities had and will have to bear the brunt of the recovery and its effects.[34] On an individual level, the insurance payouts created differential impacts, with some benefitting, others coming out equal, and one group losing equity because of the process Other changes will negatively impact future generations in more diffuse ways, such as the failure to rebuilt transport- and housing-*systems* in ways that decrease future greenhouse gas emissions. An example of more concrete future social justice issues pertains to the private insurance sector having replaced the open-ended policy with a dollar limit, which, according to a senior manager of one of the insurance companies, is expected to result in decrease of coverage across households, creating new vulnerabilities, especially among today's elderly and low-income groups (CC_16).

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[34] At the time of writing (2016) the East side (New Brighton) will receive special attention and support through the two organizations set up for the Regeneration phase. For some community leaders this is a unique opportunity that will bring the area extraordinary powers, staffing and resourcing, the like of which has never been seen before in the area. The challenge lays in harnessing the opportunity with good governance in mind. (The Press, 2016, Sept 5).

In terms of adaptability, the appraisal question asks whether aforementioned actions look 25 years ahead, accounting for different scenarios. Various plans have been developed as part of the recovery process and regular planning procedures. While they define development pathways, they may not entail planning perspectives of 25 years and consist of diverse future scenarios.

Another question asks whether aforementioned actions are guided by clear long-term sustainability goals while allowing for flexibility in the implementation stage. A variety of groups, including city council (CC_10), the Canterbury District Health Board (CC_20), and some social enterprises (CC_36) have clear guidance documents on sustainability goals and outcomes. They tried to use the recovery process to accelerate working towards these goals, displaying high adaptive capacity and creative maneuvering. In contrast, the central government is reported to have cut sustainability out of the lexicon, failed to implement the sustainability provisions entailed in the Civil Defense and Emergency Management Act 2002, and the power given to the Minister of the Earthquake Recovery Authority was used to stymy sustainability initiatives instead of supporting them (CC_8, CC_10, CC_50). Nevertheless, developments are pointing into positive directions related to attempts to incorporate disaster risk reduction and sustainability. The Māori response to the earthquakes allowed Christchurch and New Zealand to draw lessons for future emergency response and disaster recovery organized around sustainability values. Risk-based land use planning and economic analysis of risk management options have been made available as part of the resilience goals of

Christchurch and New Zealand (CC_50).[35] The building code was strengthened to reduce seismic and flood risk; the rebuilt infrastructure used a safe-system approach and materials that perform well during earthquakes (CC_10, CC-24). The various activities launched by grassroots, social services providers and the local economy fostered social capital, which is a foundation for social resilience (Horn et al., 2015). Nevertheless, there are shortcomings. For instance, infrastructures were rebuilt favoring engineered over natural systems (e.g., filtration pumps vs. natural ponds) (CC_34); the rebuild favored conventional approaches over innovative local construction technologies, although the latter have better seismic performance and show additional benefits (e.g., increasing worker safety and occupants' health) (CC_12, CC_28); and city planners worry whether the increases in the building code will be insufficient to cope with projected flood levels in some of the flood management areas of the city (CC_10).

Investigating the initiatives behind these sustainability changes sheds light on the individuals involved in these initiatives and the SCA's tactics in pursuing change towards sustainability in a post-disaster context.

What opportunities were pursued to leverage change towards sustainability? The interviews conducted suggest that there was a diversity of opportunities for sustainability transitions that emerged in the evolution of the disaster context. One respondent, a leader of one of CERA's recovery programs, identified distinct types of opportunity, which her organization endeavored to pursue as part of the disaster recovery.

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[35] Christchurch was elected to partake in the 100 Resilient Cities Initiative sponsored by the Rockefeller Foundation.

I talk about five different aspects. They are not meant to be exclusive and they are not in a hierarchy: To not let things get worse. […] To repair and fix things up. […] The do-nothing opportunity. […] The take-advantage-of… opportunity […] The fifth opportunity is around "increasing resilience". The latter two are very closely linked. Then there are opportunities that we have had and we would have liked to have taken, but did not. (CC_34)

These types of opportunities speak to the operating space that respondents perceived. The types of "not letting things get worse" and "repair and fix things up" indicate a limited operating space allowing for introducing incremental changes towards sustainability. In contrast, the types of "increase resilience" and "take-advantage of" indicate a broader operating space allowing for reforming what is there and introducing new, profound sustainability changes. These latter two types indicate opportunities to introduce transformative changes. The "do-nothing opportunity" is less a type of opportunity as it refers more to a *practice*, a way of seizing the opportunity. For the above SCAs it represents the ability to "give nature time and space and let it do its thing" as compared to restoring ecosystems, e.g., in parks and forests, to the pre-disaster status quo (CC_34). This targeted action might look to outsiders as if the responsible departments do nothing to support disaster recovery of the environment. Lastly, there were opportunities not taken, partly because they were pre-empted by the powers that be and partly due to organizational or personnel issues. Looking across respondents and their efforts, it was clear that they activated these opportunity types across various daily activity fields.

The opportunities seized by SCAs for change towards sustainability resulted in distinct outcomes in terms of the extent that sustainability has been written into legislation, infrastructures, technologies, or behaviors. A first type of outcome refers to sustainability that is actually happening as it has been written into institutions and infrastructures (sustainability is implemented). Second, sustainability continues to be pursued as renewed attempts to rectify missed opportunities or failed efforts to seize opportunities for sustainability (sustainability is being pursued). Third, sustainability exists mostly as a discourse in form of a sustainability vision (sustainability remains a vision). Fourth, opportunities were not taken, or efforts failed and were not picked up again (sustainability ended). These different outcomes indicate that sustainability efforts did not only emerge post-impact as attempts to seize the "once upon a lifetime opportunity" (Bennett et al., 2014). Rather, people continued to look for and tried to seize opportunities for change towards sustainability throughout the recovery; even after the sustainability story ended due to the changes in legislation (e.g., CER Act 2011), power structures (role of the Minister of the earthquake recovery), planning (the Blueprint substituting the city's recovery plan), and orientations (market-/insurance-led vs. participatory approaches to recovery).

I have organized people's efforts to seize opportunities for change towards sustainability into a typology that illustrates the four distinct types of opportunities and their relationships to the four types of sustainability outcomes, resulting from seizing opportunities. Table 7 visualizes the typology for select daily activity fields without being an extensive representation. In the text below, I present this typology and illustrate it with examples across different daily activity fields provided by interviewees.

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Table 7

Overview Of Types of Opportunities Seized and Types of Sustainability Outcomes

Generated for Diverse Daily Activity Fields

Opportunity… Sustainability…	To contain damage	To fix damage	To reform what is there	To introduce something new
Is implemented	Recreating	Caring (Environment)	Eating	Engaging
Is being pursued	Engaging	Caring (Insurance)	Being mobile	Housing
Remains envisioned		Energy systems	Working	Recreating
Failed	Infrastructures, technologies		Engaging, Housing, Caring	
Change is rather:	incremental		transformative	

Type of outcome: sustainability is implemented: This outcome entails

sustainability initiatives that existed before the disaster and were accelerated because of

the disaster as well as new initiatives that were conceived because of the disaster.

Leveraging disasters to accelerate existing sustainability initiatives is an important

opportunity because it is a low-hanging fruit to dramatically advance an initiative. As one

interviewee, working for central government, commented, "Many things were triggered

and accelerated that were otherwise being put off. […] They are now more future-focused

than focused on the past." (CC_45)

One SCA, volunteering in a leadership role for the local food movement that

originated pre-disaster, explained their efforts to institutionalize a policy for local food

resilience and security in Christchurch: "While we pursued the same activities and ideas

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[as ever] we just couched them in different languages to make our projects fit the earthquake situation. There was a void and we were ready to fill this void with good ideas" (CC_57). The successful promotion of the UN's Child-Friendly-City Initiative was always planned, as one SCA, a senior program manager of a local Third Sector Organization, explained, but they did not expect it to be pursued so soon. Her organization decided to start adopting it now in order to "tap into the post-earthquake opportunities" as "Christchurch had become a boomtown" and because they were now well connected with other Third Sector Organizations and government agencies as a result of the earthquake response and recovery (CC_51).

One SCA, a government employed sustainability expert, explained that leveraging disasters to introduce new, previously undesired ideas represented a unique opportunity not to be missed. He reflected on the reactions among city council staff related to unsuccessful efforts after the first earthquake in September 2010 to decrease future disaster risk by increasing the building code:

> They were saying: This is really hard! What you are saying is going to change the face of the city. And then the second earthquake did change the face of the city! So, all of a sudden, I came in and they were talking about it [designated flood risk management areas]. […] So, this is an example of betterment that happened despite people not wanting it to happen. We just made a local law that said: If you are building a new house, in these [flood management] areas, it has to be a meter higher than it was before. (CC_10)

Some changes towards sustainability are on the books and their realization is just a matter of time until they appear e.g., in the built environment. However, because these

changes are not yet visible or widely known, sometimes due to restricting communication

protocols, public discourse does not perceive that they are occurring. An example of such

a change pertains to the activity field of Engaging; it is expected to potentially represent a

historical shift. A SCA with insider knowledge as she served on the advisory board for

the design team explained:

> So, Ngāi Tahu [Māori tribe of South Island] contribution to those projects will
>
> result in tangible results. There has never been an opportunity for an Iwi [tribe] to
>
> influence the cityscape like this. So, the anchor projects, they will—as far as is
>
> possible within the existing constraints—reflect Ngāi Tahu values and as far as is
>
> possible have Ngāi Tahu imagery, stories and names. This will be the first city in
>
> New Zealand that physically represents biculturalism. To the best of my
>
> knowledge, it would be the first city in the world that endeavors to physically
>
> represent heterogeneity in the urban landscape and that is monumental. […] That
>
> is the most radical shift in the city's identity. That is an opportunity that is almost
>
> indescribable. (CC_35)

The quote illustrates that a change is in progress but it is invisible to the broader

public and hence lacks acknowledgment. Invisibility of change has been a major

challenge for some SCAs, because they start losing their constituencies. In some

instances, invisibility of change was key for success. For instance, the government's

recovery process did little to avert the housing crisis, especially for vulnerable groups,

despite long-standing calls to provide social housing options. Therefore, a coalition

silently went ahead, implementing a social housing program to create a precedent, and

other NGOs followed suit, while avoiding getting caught up in a debate that is controlled

by government (CC_56). At the time of fieldwork, additional government-led social housing activities were announced. Invisibility of change should also not be confused with inability to effect change because of unsupportive governance structures. Recall the coalition of NGOs, who managed to get a seat at the table of one of CERA's committees. Although often unable to effect tangible change, this group insisted to stay on, in the words of one SCA, who served as third-sector-representative on the committee: "having a delegate there has shaped the way how these other organizations work […]. This is not outcomes; but it's process. And that's pretty cool!" (CC_7). This seeming (and often forced) passivity is relevant as an advisor to some sustainability initiatives concludes:

> The very existence of this group pulls the reality in a certain direction. Nobody wins and nobody really loses. It is more an ecological way of thinking. So, even to be is to be successful. I tell this communities, who were beaten up or are feeling let down, hoping that they will feel some empowerment by this thought. (CC_55)

This type of opportunity is important because it focuses on achievements. At the time of fieldwork, people were deeply frustrated with the recovery and often unable to see positive developments. One SCA, a member of the association of social service providers and head of a third-sector organization addressing violence against women, notes: "people see only the mess and the problems and believe that the recovery process is doomed anyway in light of what has happened so far. This makes you blind to see the heaps of innovations, collaborations, and positive changes that happened." (CC_54)

Type of outcome: sustainability continues to be pursued; "when efforts fail, try again!": This outcome emerged because a preceding opportunity was missed, or a

sustainability effort became a "casualty of the recovery" as bureaucratic processes grounded fledgling initiatives or it was settled as a compromise, where people felt they got the shorter end of the stick, or SCAs themselves faced trade-offs when trying to implement their visions. For instance, the Minister of the Earthquake Recovery instituted a community forum to request participation of diverse voices, including those of vulnerable groups. While this was a breakthrough as the community became finally recognized as a stakeholder in formal decision-making, forum participants were constrained in what they could do. Two SCAs, appointed late to the forum to represent sustainability were concerned as mostly, forum members were left to comment on prefabricated agendas and documents (CC_38; CC_1). These situations created a gap or need while simultaneously narrowing the operating space for sustainability initiatives. One of the SCAs, working to support various groups in strengthening their sustainable visions for the future of the residential red zone, stated: "Initially, there were big changes and the disaster created the opportunity to contribute to a process to do things better. But now there is growing frustration as there is little opportunity, really" (CC_42). Another SCA, a transportation planner and supporter of cycling advocacy groups, tried to be more hopeful in his assessment related to transportation.

> Some small things were done, which would otherwise be difficult to be done in New Zealand because of the priorities of the Government and the funding policies. So, having the infrastructure in the inner city core is nice, but it does not address the issue of people living in 10 km distance and are unwilling to switch back after they used their cars again [post-disaster] and the new land-use structure has been established. (CC_13)

Considering these setbacks, some organizations felt prompted to become active

and "make things right" and "develop solutions to emerging and persisting issues [by]

working with the agencies and within their networks" (CC_41); such as supporting

insurance holders in dealing with insurance claims as well as working with public and

private insurance entities to help them responsively account for the psychosocial situation

of most claim holders in their interactions. Another example pertains to housing. One

SCA, a government employed sustainability expert, explained how the city of

Christchurch endeavors to locally adapt and write into the city plan a set of green

building standards (called BASE)[36] initially failed. But a network of leaders coalesced

and over the past four years continued to push forward, leveraging the power of inter-city

networks:

> I had central government come down and tell me: […] If Auckland does it and
>
> Christchurch does it, the two biggest cities in NZ, well you are effectively
>
> rewriting the building code. Well, you can't do that. That is our job. So, we are
>
> going to rewrite the building code. So, MBIE has just agreed to do value cases on
>
> these things […] In six months time they will come up with guidance for industry
>
> how to build better buildings. And then, maybe in 2-3 years down the track, they
>
> will turn those guides into standards. […] So, this is the game we are playing at
>
> the moment. I am saying: I am going to do this! I am going to do that! (CC_10)

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[36] The city's BASE program is a modification of the established, but expensive and highly complex
Greenstar program; "it waters things down a little bit, but it accounts for the situation that in recovery,
people want to rebuild as fast as possible and they don't have capacity nor extra money for expensive and
complicated things." (CC_10)

As above, this outcome – initial failures that spark renewed action – highlights the need for caution against labeling something as failed or entirely missed. Such verdicts can disempower and discourage future action. The examples indicate that missed or failed opportunities are indications that people try, with mixed success, to redress missed opportunities or failed efforts. Furthermore, this opportunity is important because the long-term nature of disaster recovery requires persistence and ability to remain vigilant and ready. A SCA, who, as member of the association of social service providers, saw firsthand the hardship experienced by many because of the disaster, nevertheless argues:

> There are still many things that need to be addressed as part of the recovery, others need retrofitting, and on a societal and sociological level the changes and unintended consequences that have happened have not even unfolded and manifested. As the recovery is and should go on, there will be more opportunities coming, but one needs to be able to see them. (CC_54)

Type of outcome: envisioned; "Pursuing sustainability visions": This type refers to sustainability visions that were, in the words of a respondent, "floated around," (CC_33) because the conditions for building buy-in into the visions were considered to be favorable as a result of the disaster recovery process. For example, the area of energy was seen by respondents working in that field as "the biggest opportunity." One of them explained, that while they did not yet go anywhere, because it was hard to get everyone of these ideas off the ground, "people working in the energy-opportunity spaces still see lots of potential" (CC_18). They explained that this potential pertains to the newly built district energy scheme, which can be expanded in the future to share waste energy with all sectors across the city or to scale the smart grid pilot, tested in Christchurch, across

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New Zealand. Another example of a sustainability vision pertains to the future development of the residential red zone. Disillusioned by past government-led processes, a group emerged and successfully organized a participatory visioning process how to use the residential red zone, considering diverse goals including healthy recreational options, natural flood mitigation, sustainable urban development, and nature conservation. Additionally, other groups move forward with realizing small steps of related to this vision, although the central government's decision is uncertain.

The development and sharing of visions for change are important in that they may stimulate subsequent action. A SCA reckons: "So, people will look back, if they don't know where they are going. And that is the biggest risk that we face, that there is no vision for the city" (CC_20). Meanwhile, some visions cannot be pursued quickly. Their credibility needs to be built because "people come to new ideas slowly. […] Often it is about talking about ideas and presenting them as ideas, just floating them, discussing them, dealing with the objections, but actually not pushing too far." (CC_34) Collaborations helped to keep visions alive.

Type of outcome: ended; "sustainability efforts failed": This outcome refers to change towards business as usual or unsustainability because opportunities that were created by the disaster were not seized to advance change towards sustainability. These missed opportunities were most frequently identified by the interviewees in the areas of public participation in planning, in advancing sustainable rebuilding and repairs (instead of replacing 'like-for-like'), in avoiding a social housing crisis, and in investing in future-proofing infrastructure systems, i.e., infrastructures that are sustainable and resilient over the long-term. The take-over of the disaster recovery process through central government,

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in particular the power bestowed on the Minister of the Earthquake Recovery, created a lot of tensions, and is seen by many respondents as the root cause for missed opportunities. One respondent noted that many of her SCAs friends felt stymied in some of their opportunities and "in sustainability especially, because the way [sustainability] is used by the government" (anonymous). Recall that various SCAs perceived it as a major challenge that the incumbent central government had taken the word sustainability out of the lexicon and key documents, replacing it with resilience (CC_50). Another SCA, a local government urban planner, recounted a situation where the Minister declined to consider sustainability efforts: "he stared me in the face and said: 'I'm not interested in sustainability'" (anonymous). Missing the opportunities for sustainability meant for instance that traditional infrastructure systems and technologies were put back in instead of worldwide leading homegrown technological innovations for seismically safe and sustainable rebuilding, solar power, or natural ecosystem-service functions for managing flood and storm water as recounted by SCAs involved with researching, implementing, or financing novel technologies (CC_12, CC_28, CC_34). These hard structures will now stay there for decades to come.

The perception of these outcomes resulting from 'missed' opportunities were important in shaping the recovering process because the actors perceiving these losses were often left bitter, which hindered their ability and willingness to engage.

This section identified some of the opportunities created by disasters, which SCAs leveraged to advance their sustainability initiatives, albeit with different outcomes. The next section explores the practices, which SCAs used to see and seize opportunities and sustain introduced changes over time.

How did people and organizations leverage the window of opportunity created by the disaster in efforts to advance change towards sustainability? This section presents the practices used to leverage opportunities for change towards sustainability along a sequence of three phases: seeing and seizing opportunities as well as sustaining introduced changes over time (see figure 10).

Seeing	Seizing	Sustaining
Optimistic mindset	Prepared to take risk	Self-care and other-care
Focus on sustainability	Person-to-person engagement	Build social capital
Enabling environment	Experiments and pilots	Compromise on project not vision
		Collaborate, enroll others

Figure 10. Main characteristics and practices across sustainability change agents in Christchurch.

Seeing opportunities for change towards sustainability. Some SCAs stated that one reason, why they were able to leverage opportunities created by the disaster was that they purposefully looked for opportunities because they are skilled in seeing them, either because it is their job or their personality. For instance, one respondent, a politician stressed: "I see opportunities all the time, in good times and in post-disaster times"

(CC_58). Others who felt catapulted into the role of a SCA saw opportunities because they always wanted to engage with sustainability: "So, I was primed in that sense for an opportunity" and "the earthquake catalyzed me" (CC_36) or because they felt compelled to identify opportunities because they were "deeply exasperated by the extent of the problem [post-disaster housing] that was so bad in the first place" (CC_36). Additionally, another SCA, holding high level leadership positions, found that being an approachable person, who makes a point to "be in the community, talking to people constantly, everyday" (CC_45) amplified their abilities to see opportunities.

In addition to these personality aspects, other work and social circumstances played a role. Generally, SCAs recognized opportunities after they reassured themselves they had done everything to address urgent needs such as caring for family, friends, strangers and one's professional responsibilities. The ability to pause temporarily in the midst of the post-disaster frenzies allowed one SCA, working for the mental health care department of the Canterbury District Health Board, to reassess their organization's work processes and "to see where things don't add value and don't make sense in a way that wasn't or didn't seem possible prior to the earthquake" (CC_21). This ability to reflect kicked off a process of complete restructuring of mental health care processes around principles of people-centered, community-based and integrated care:

> We had five days were we were evacuating the elderly. That was our focus. When
> we were finished, we got looking around and thought what else do we need to be
> doing? Mental health services had an immediate lull in activity in terms of
> demand […] We could see that potentially this could change […] and we could

see huge increases at once. So, what could we do to get prepared for that? (CC_21)

Some SCAs were out of town when the deadly February 2011 earthquake hit, which they identified as an enabling factor to see opportunities. While they were shaken, they could follow their urge to do something because they could "reflect and act with more distance from the horrific nature of the thing" (CC_47) and thus felt they "had the advantage of having a clear head of thinking" (CC_53) to strategize how the opportunity can connect with wider efforts in the field. More importantly, however, than being there or not, was that most SCAs reported they were able to see opportunities because they "found themselves in a privileged position", including good health, some financial and professional wiggle room, and the endorsement from their family and friends to venture off (CC_40). Another enabling condition as some SCAs stressed, was that they found each other and built good collaboration. In the words of a young SCAs, working as self-employed consultant to start-ups:

> We were lucky because we found each other and we gave each other the peer support that we needed to first not do the self-doubt that 'I must be mad to think that this is possible.' We got each other over that self-doubt process and we gave each other really practical support. Being able to really find the mavericks and to encourage the mavericks to have a crack and to—as far as possible—try and connect people so that the mavericks have a team of people to do things differently. (CC_35)

A SCA, using her role as politician to support sustainability initiatives, underscored the role of peer support, because "not all opportunities were easy to see and

people did not have experiences in doing it;" yet, she observed, the peer support created a "positive feedback loop" helped people to act upon these opportunities (CC_58).

Nevertheless, some SCAs and their organizations, including the organizations involved in the sustainable food or sustainable housing movements, only found "some peace of mind" when they were able to "stir up these discussions and ensure that we did everything to help people think about the earthquake as an opportunity rather than a disaster." (CC_57) They conclude that it is not enough to see opportunities; you need to be a catalyst and have the skills to bring people with you (CC_36).

Seizing opportunities for change towards sustainability. Seizing opportunities was constrained and enabled through the specific context, which evolved rapidly post-disaster. Table 8 paraphrases contextual factors, which respondents identified as shaping the environment within which they tried to seize opportunities and sustain introduced changes over time. The phase of seizing is split into two phases, as opportunities were seized shortly after the impact and in later periods of the recovery. The findings correspond with proposals in resilience literature describing phases of transformative processes, c.f., Westley et al., 2013 (bottom row in Table 8).

Table 8

Overview Of Select Enabling And Hindering Contextual Factors Influencing SCA Tactics

Context	Seizing (early phase)	Seizing (later phases)	Sustaining
Formal rules: recovery (c.f., fig. 1)	CER Act 2011 (expires April 2016)	CERA Recovery Strategy (2011-2014); programs to be implemented e.g., NERP since 2013	Urban Regeneration Program ends in 2018 Anchor projects to be implemented: 2018-2025
Formal rules: City council	Rules and business as usual went out of the window. Trust as currency.	Rules are lax, but come back; narrowing the funnel for opportunities.	Rules are changed. Christchurch is a test-bed for healthy, sustainable living
Informal rules: Public discourse dependent on psychosocial context (c.f., fig. 2)	Anything goes. Anything is better than nothing. No requirements, no consequences. Status and qualifications went out of the window.	Some things are better than nothing. Compression and alignment of organizations determines those that can stay afloat.	Mixed mood society: some benefitted while others are still suffering from disaster recovery. The net comes back in as people look for stable things, concrete offerings
Relationship: sustainability story and formal processes	Align: people create future visions, focused on sustainability ideas. Share-an-Idea campaign is pinnacle of this time.	Diverge: formal process throws sustainability out of the window; sustainability fights back, wants to be included; gets tired.	Strengthen to reconnect: sustainability regains spirit, focuses on creating internal connections among community.
SCAs tactics *"That evolution (*) is in different ways matched by institutions all over the city."*[37]	*Fire!! ** Just do it! Free-wheeling experimentation. Cupcakes and a cuppa: slow process of deep and authentic engagement with people to reach hearts and minds	*Steady, Fire! ** Get ideas off the ground. Use experiments to build evidence and grow trust Build a team of visionaries that are complementary (minder, finder, grinder), able to evolve, and collectively accountable	*Steady, aim, fire. ** To remain relevant: -see the hardship and the magic; uplifting things -engage in reflection and ensure self-/other care -change activities from recovery-related to un-related to recovery
Westley et al., 2013	Let 1000 flowers bloom: by encouraging experimentation and unfettered innovation	Create Umbrella Projects: by coordinating individual projects around the same cause and collectively leveraging already allocated resources	Move from the experimental to the political: by selecting the best ideas from previous phases and connecting them to the reduced amount of resources to lever change

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[37] Another respondent explained his organization's evolution of tactics: 1. Reacting, 2. Finger-pointing, 3. "Could we…?" or "I like that suggestion", 4. "We'll do it ourselves instead of asking others", 5. Taking the lead in the absence of leadership, 6. Encouraging others to take the lead on a project (CC_41)

To seize perceived opportunities, SCAs reflected how the disaster experience urged them to pursue change and post-disaster times enabled them to "just do it" in order to get ideas off the ground. They recommended: "Head forward instead of waiting […] Be wary, if something can be done now, do it! Otherwise, the opportunity is lost." (CC_41)

Taking this leap of faith and "stepping into the unknown takes courage and not all of us have courage" stated one SCA, who was a member of the leadership team involved with the transformation of the Canterbury District Health Board (CC_20). Similarly, other SCAs reinforced the idea that seizing the opportunity means taking risks, because it "is supposed to be a journey into the unknown" (CC_35). One SCA, working for a charitable organization to help ease their ability to support social enterprises, summarized her experience:

> Knowing what I know now, I know I would never have started, because it was such a big thing that we were doing. But sometimes, it felt like the right thing to do; it felt like the right time. It seemed that Christchurch offered a place to trail and test some of these new things. I did not want to go back to the old Christchurch. I want it to be an exciting and dynamic place to be. But: we can overthink things sometimes. So, better just start it and do it! (CC_52)

While some actors would have been unable to undertake risky change efforts in normal times as indicated above; even those trained to take such decisions in normal times on the spot and under uncertainty felt challenged. The SCA working in mental health stated this as a twofold challenge: first, requiring trusting in oneself, and second,

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giving confidence to others to trust in the process, acknowledging that the process was unknown and uncertain (CC_21).

To get ideas off the ground, groups used experimentation. Experimenting was free-wheeling, especially among Third-Sector Organizations and start-ups in the creative economy as one of them said: "I reckon it was 1-2 years where we had space to just experiment [...] it was all about experimentation and lots of things have happened" (CC_35). SCAs found that experiments were encouraging, because often "the cost of failure is so little [...] If it did not work out, you most likely did not harm anyone or anything and did not loose much. So: just have a go. You might as well win!" (CC_58). Meanwhile, agencies took more formal and research-supported approaches to experimentation in order to gather evidence that delivers a proof of concept, informs actions going forward, and builds trust for sustainability initiatives across departments and industry groups, as illustrated by one's SCA experience, who worked to get the commitment of developers and other stakeholders to invest in sustainable construction of housing:

> Their [developers'] logic is: it is too expensive and it is too slow. They said: I don't believe it. And I said: Lets prove this. So, we applied those two guides [about sustainable housing] on 10 houses [...] So, on the basis of these guides and on the basis of the ten case studies, we established the Canterbury Sustainable Homes Working Party. (CC_10)

Groups used persuasion to "to break the mold" in order to move their vision forward, as one SCA, a politician working towards a sustainable economy framework, stated (CC_33). This practice echoed across other SCAs as well. They said that efforts to

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enroll a critical mass of relevant stakeholders "took a lot of cupcakes" (CC_10) and "lots and lots of cups of coffee" to "share ideas with people and drag the model around town" (CC_36). As "the advertising did not work, the media stories did not work" the SCAs found it was the "person-to-person discussion," which was effective (CC_10). Although this "deep and authentic engagement […] is necessarily a slow process, […] the energy it builds up is very deep". (CC_36) The key is to open ideas up for "rigorous examination" and not to proselytize: "we don't have time to convince people about our ideas. We have to hope they get it and run with us, otherwise we are getting bogged down" (CC_36).

Another practice to seizing the opportunity was to build strong teams that were composed of visionary people, with complementary skills and expertise to allow looking at issues from different perspectives, including opposite views. Also, finding allies in government and other organizations, who were open to new ideas and ways to realizing them was important. One SCA, leading one of CERAs recovery programs and who was personally involved in environmental advocacy groups recommended "to have the right person from the right level in your group. Somebody who sits a little bit higher up that tree, who has access to information, but who also is a practical person" (CC_34). Effective teams considered the "fact" that "we are, the people in the room, collectively accountable for designing a system that is going to work better" (CC_21). They understood when "someone is tired and traumatized by something and needs to address their own stuff […]. Because they share the vision and have the capabilities, they are able to continue" (CC_20). In the private sector, collective accountability manifested as collaborative competition, where people shared gain and pain as one respondent, working for SCIRT, said: "the measure of success is not whether you are achieving, but whether

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the overall program is achieving" (CC_24). While building strong teams was necessary for seizing the opportunity, maturing and restructuring teams and organizations, especially if they existed pre-earthquake, was equally important, as one SCA, involved with the sustainable food movement, which became institutionalized and supported through the city of Christchurch, stated:

Responsiveness is very important. It is a dynamic movement and there is no guarantee that a structure developed one year will work the following year. However, structure is important to enable action. We need to make time to develop useful structures, but we have to be prepared to scrap them at the first sign of disharmony. The work is about nurturing joy and love. In the end that's what will keep people motivated to participate. (CC_57)

Another practice involved with seizing opportunities was to unlock situations, especially those involving government agencies. As some allies were constraint by the rules and working cultures of their organization, the SCAs had to find ways to respect this culture while enabling allies to support the initiative. Addressing this dilemma, one SCA, working for a Third Sector Organization, that successfully changed the way public and private insurance and CERA entities engaged with local communities, developed the tactic of creating a pivot point, which he explained:

We take the lead in developing and implementing a project and invite key agencies to participate. We say: 'We lead it so you can come and join, yet, by joining you do what we want to do.' This is a way of freeing representatives of agencies up to behave according to their hats and allow them to engage in new ways. This might be in particular important for CERA, which has become so

politicized. They can't do anything right anymore. This is a lot of stress for the

individual people working for CERA and has stalled the process. We realized this

need for getting unstuck and for resolving the bottleneck. (CC_41)

In a similar vein, another SCA explained his approach to strategically facilitating

inter-departmental and cross-sectional connections between government entities or

between government, industry, and NGOs, in order to unlock situations and enable

institutional change:

Here is central government [energy department] saying: You need insulation in

your home. Here is central government [insurance department] saying: 'We are

not going to put the insulation in the home!' And then I said: 'Well, you guys

should talk to each other. Surely, you are both central government, why don't you

have a discussion?' So, they had a discussion, and it was agreed that they would

come up with a guide how they could include insulation in the homes. So,

fortunately, I did not do this. But I just said: You guys need to talk to each other.

They went away. Came up with the guide and then said: OK, we will allow

insulation to go into homes. That unlocked it! (CC_10)

Sustaining introduced changes towards sustainability over time*.* Sustaining

change has a double meaning. It refers to SCAs ability to translate their initiatives into

institutions and products as well as to sustain themselves and their organization in a

changing environment. One SCA explained how these efforts of sustaining where further

influenced by the changes in context (c.f., Table 8):

Things are starting to go back to normal. Now, there is no need anymore for

'something is better than nothing,' in fact this approach receives now lots of

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critique […] Considering that critique, the barriers to doing something—in fact anything—are coming back. Additionally, people are facing exhaustion. (CC_40)

While SCAs faced increased public expectations and personal exhaustion, they also struggled to maintain their positive outlook, nurtured by looking at uplifting things, against disempowering feelings of regret. One SCA, working for pedestrian and bike friendly infrastructures, stated: "the nagging question remains always 'could we have done more, better, and faster?'" (CC_13). Another, who was involved in various local groups, including with Ngāi Tahu, observed: "there is heaps more that could have been achieved, if we would have dreamed bigger and more daringly" (CC_35). A third tried to encourage himself to keep going in order to reduce future energy consumption: "we have done some really good things. But if you look at it in terms of what was the opportunity to do something really transformative, then … it is still there, and it is still a long way to go, but—" (CC_18). Thus, this phase really tested which few organizations were able to pass as one advisor to change processes describes: "Organizations that continue to exist are pragmatic organizations, they pragmatically identify ways to get on; others feel overly challenged by their frustration with the whole process and are absorbed by their sense of feeling overwhelmed; others just give up." (CC_44).

Looking deeper into one of the "pragmatic organizations," that managed to sustain itself and its sustainable housing enterprise, its SCAs compared their experience to competing in an endurance race at a sprinter's pace and resolved: "You need to manage yourself in order to manage the enterprise" (CC_36). Many SCAs are overworked because their engagement exceeds their paid job or is done voluntary on top of their paid job. Moreover, one SCA, who participated in a variety of sustainability-

oriented initiatives, shared her perception that people now realized that it "takes sooo many years […] 15 or 20 years realistically, [until] the city is back on its feet again" (CC_9). To ensure sufficient self-care among the people carrying the initiative forward, some SCAs, whether they work for TSOs, as newly minted entrepreneurs or as managers for the biggest employer in Canterbury (the Canterbury District Health Board), they all "make a point of taking time regularly to discussing things beyond the workday" (CC_36) and to be "kind" with each other (CC_20). Despite opportunity costs of being unable to work on pressing issues, they "got value" out of their structured weekly reflection (CC_41). It allowed them to understand what was going on and "have informed discussions on the same platform, not personality driven ones" (CC_21).

Another practice to stay in the endurance race was striking a balance between working to deliver the project on a daily basis and working to enliven the vision. Keeping the vision alive is an important part of the "healing process" (CC_42) observed one SCA, working to support various groups in strengthening their sustainable visions for the future of the residential red zone. It helped people think forward not back and to think about the bigger picture observed two SCAs advising various groups, from grassroots to CERA appointed design panels (CC_35, CC_40). And it provided a benchmark to assess progress, which was important for an SCA working in the city (CC_10). Striking the balance between visioning and working towards the vision enabled SCAs to see when new opportunities opened up and to be ready to act: "There is a time for every thing. And, sometimes, you just have to wait. But then—when the time comes—you have to go all in. But until then, you have to conserve your energy" (CC_33).

The other part to sustaining is to ensure ongoing relevance of the sustainability

initiative in a situation where competition among organizations increased while disaster-

related and other funding ended. One SCA resolved to increase coordination across

sustainability initiatives, although his organization had enjoyed great support across a

diversity of organizations, including the city:

> It was vital for [our organization] to acknowledge that other organizations exist
>
> and to engage with them. Of course, there is competition […] But if it is just [us],
>
> we as a city have lost; [our organization] has lost. These initiatives need to
>
> become part of a movement: the movement will outlive the individual initiative.
>
> (CC_40)

To assert the movement, the leaders of initiatives need to focus on "building the

new, not fighting the old" (Millman, 1980), as the latter absorbed a lot of energy. In

Christchurch, many experienced this loss of energy as one SCA, who engaged students

and youth groups in disaster recovery initiatives observed: "Because people fought

against the imposed structures, which was a fight that they could not win at that time,

they expanded a lot of energy, which they lost instead of investing it in something where

it feeds them." (CC_47)

Making this switch in focus was crucial, especially at a time where governance

arrangements were about to shift some power back from the crown to the local level and

the operating space had been narrowed. An advisor to a diversity of initiatives urged:

> We have to focus now on creating small successes and realizing feasible projects.
>
> This way, you create the Christchurch you want. You don't accept the overarching

situation, but you understand it and are strategic about it. You make the most out of it by going forward with your own projects. (CC_44)

Strengthening the movement also requires finding ways to keep people enrolled in the initiatives. To this end, the Canterbury District Health Board developed the "permission card," which is a training program where staff members learned about the organization's sustainability vision as well as strategies and actions to achieve it. Completing the training successfully, people received their permission card. They could play the card, i.e., implement their envisioned change without asking formal permission, when they saw something that needed to be changed and when they could explain how their envisioned change contributed to achieving the pillars of the vision. The permission card helped to "keep the disruption and the energy almost constant" and reduce risks to "harden into the bureaucracies too soon" (CC_20).

Enrolling interest groups into the discussion was another way to advance changes, which leaders of sustainability initiatives could not get otherwise, because they "had limitations with regards to how much we could consult because there was the risk that the Minister [of the Earthquake Recovery] could turn the whole thing around, once it landed on his desk." (CC_34) Keeping people enrolled also referred to the broader public who needed to know that change is happening; especially when change is not visible for them, as only few people are in the know due to formal communication constraints. One SCA, using his role as a journalist to support sustainability initiatives, resolved:

If you see just a few things happening, as evidence, as physical evidence of some progress; that is very optimistic and positive and inspiration. […] It has to be

visible and make a difference. Otherwise, what you see there is lots of wasteland

and fighting. (CC_22)

Making change visible can happen through discourses and debates, visibility in

the built environment, awards and conferences; it helps instill confidence in people.

Another practice to ensure ongoing relevance of the sustainability initiative was to

transition from framing activities as related to the disaster recovery to framing them as

unrelated to the disaster recovery. The sustainability initiatives contributed to the disaster

recovery and leveraged the disaster recovery to advance the initiatives, but they were not

contained by the disaster recovery; they exceeded it (CC_38).

Discussion

Progress towards sustainability. Although the findings related to the

sustainability appraisal are colored by the perspectives of the SCAs who are deeply

embedded in these processes and my own reading of their appraisal, it becomes clear that

the antagonistic relationship between sustainability efforts and those institutional efforts

that worked against them caused sustainability losses and narrowed the operating space

for sustainability. Moreover, sustainability initiatives weakened themselves. They

refocused their energy late from primarily fighting the institutional impediments to

strengthening their sustainability efforts. And many sustainability initiatives focused

primarily on one aspect of a comprehensive sustainability notion, although sustainability

cannot be achieved by accomplishing individual goals, due to its systemic nature.

Nevertheless, while contesting the formal recovery process some also created parallel

realities (Scott, 1998), and the sustainability initiatives made progress towards their goals

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and built potential to further progress. This potential manifests in the shifts in networks, perceptions and meaning, social coordination, institutional arrangements, and organizational structures, which Olsson et al. (2006) identified as evidence of transformation. Against this background, the question arises what to do to ensure that the whole sustainability space expands (see figure 11)?

Natural Environment & Natural Resources
Social Wellbeing
Livelihoods & Public Finances
Equity & Equality
Adaptability
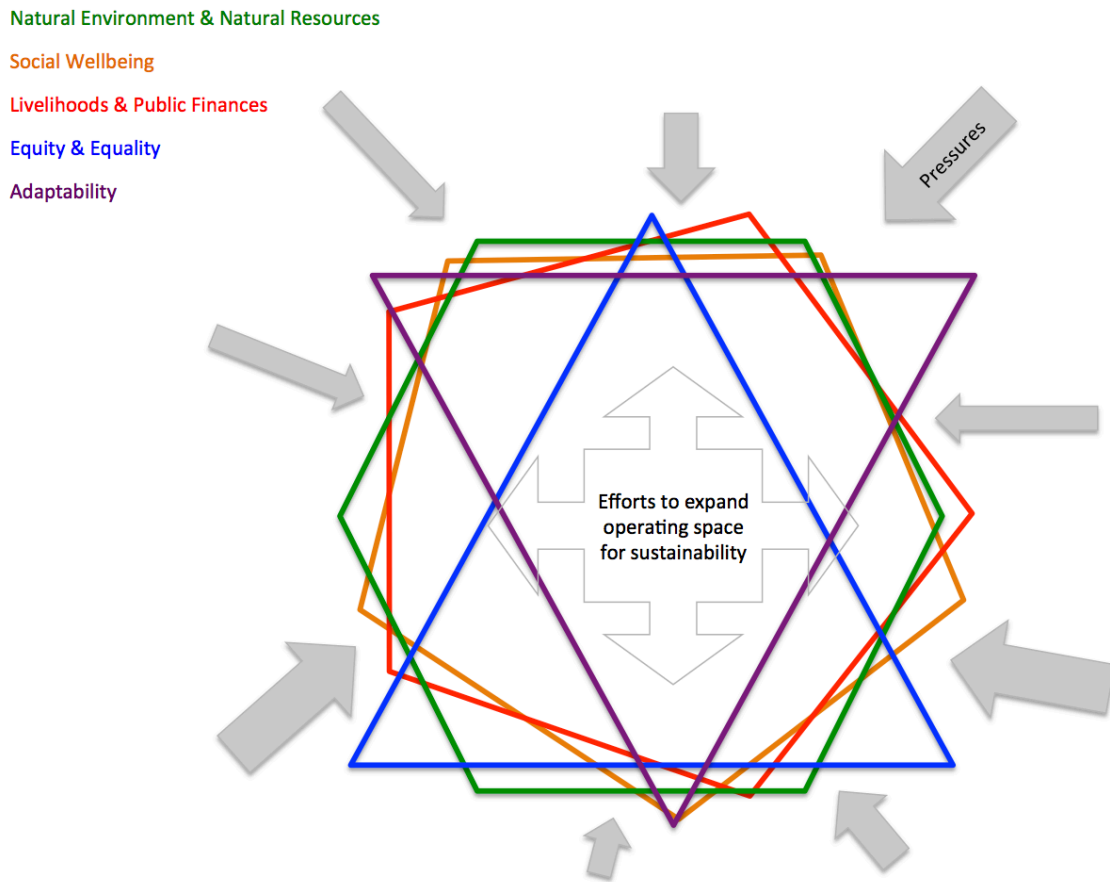
Figure 11. Illustration of sustainability initiatives pushing back against a narrowing operating space for sustainability

Looking at this question through the lens of transition literature, specifically power in transition provides some guidance. The past years of the Christchurch disaster

recovery were marked by a perception that there was mostly one power relation: the central government using coercive "power over" the people in Christchurch that was destructive and aimed at fostering the status quo ante. This perception was aggravated because people lost their intrinsic sense of having power as one respondent observed: "they forgot it or they were made to forget it" (CC_58). Another SCA, involved into a variety of community- and neighborhood initiatives, resolved that people "need to remind themselves that they have power and find ways to feel their power" (CC_38). Supporting this endeavor of rethinking binary concepts of power, the idea of diverse forms of power helps. Avelino and Rotmans (2009, p. 563) argue "Distinguishing different types of power relations helps to acknowledge and indicate the possibilities for change, and to deconstruct discourses that assume power by the 'vested interests' and the 'status quo' a priori obstructs power exercised for upcoming interests or alternative practices." Hence, "power over" is only one form of power and sustainability leadership can weaken such power imbalances by using positive forms of power, including "power with" (cooperation and learning) and "power to" (resistance and empowerment) (Partzsch, 2015). Mobilizing resources (e.g., people, assets, materials, capital, knowledge, or ideology) to build "power with" and "power to" is already a way of exercising power. When viewed across the board, the people involved with the sustainability initiatives in Christchurch that formed part of this research, exercised power in diverse ways. Some exercised innovative power in the early days when the mavericks found each other and gave each other peer support to develop their alternative ideas. Others exercised constitutive power by getting community- and third-sector-groups acknowledged as stakeholders next to government and business groups, and by securing for them a seat at the government's decision-

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making table that allowed influencing redistribution of resources at a structural level (at least to some minor extent). The sustainability initiatives that the SCAs were able to sustain into these later stages of the disaster recovery process exercised transformative power because they successfully established partnership groups that linked niche-actors to each other as well as to regime actors resulting in broader and stronger networks. Lastly, most sustainability initiatives exercised destructive power by speaking out against government plans and proposals, and through writing submissions during public consultation periods, engaging in one-on-one conversations with decision-makers, and employing forms of open protest. In addition to different forms of exercising power, conceiving of different power relationships between groups could also help with breaking binary conceptions of power. Avelino and Rotmans (2009) differentiate between power relationships that can be cooperative (when groups with more and less power join), synergistic (when groups with different resources complement each other), as well as competitive or antagonistic.

The notions of "power with / to" also suggest the networking of the sustainability initiatives into a bigger movement that pursues a comprehensive sustainability agenda, while accounting also for select sustainability goals of individual initiatives. A broad agenda allows the movement to make some progress somewhere all the time, even though political debates block particular issues (March, 1982). Such collaborative approaches are described as "collective impact approach" (Kaina & Kramer, 2011), and "umbrella projects" (Westley et al., 2013). They bring initiatives related to the same overarching theme together. Foundations for this have been laid in Christ-church and can be built upon. For instance, some social service providers responded to the collective

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impact approach employed by the Minister of Social Development as one of its funding

requirements and created networks to ensure they cover a neighborhood in all its social

and spatial dimensions. While less formal and organized, a variety of networks and

collaboratives evolved and shared facilities ("hubs") in Christchurch. These shared and

collectively used spaces were born out of necessity during the disaster and now are a

purposeful goal of reconstruction efforts.[38] In addition to this horizontal collaboration on

the ground, vertical collaboration was important to achieve impact. Some sustainability

initiatives in Christchurch have successfully created linkages to organizations, including

government, Third Sector Organizations, and businesses, operating at national and

international scales, in order to tap into the resources they provide and to use the

endorsement of these authoritative voices to push their sustainability efforts locally. The

combination of horizontal and vertical relationships, which in disaster literature is called

bridging and linking capital (Vallance, 2011), will allow a movement to identify

opportunities for "transformative touches" in the future to translate incremental steps into

institutional change (Park et al., 2014).

SCAs practices to leverage opportunities & implement change to

sustainability. The findings suggest that some of the SCAs engaged in disaster recovery

were able to see and seize opportunities and sustain many of the introduced changes. The

interesting point here is that their actions were not only focused on the window of

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[38] Working together in hubs and towards shared goals is not only happening on the grassroots level. It is also happening among the recovery projects, for instance among government agencies operating in the Justice & Emergency Precinct; Accessible City and Canterbury District Health work together on goals related to accessibility and dementia friendly city, the East Frame Precinct and Canterbury District Health work together to test various approaches how to develop communities in different ways and how the built environment can change the nature of communities (CC_45).

opportunity opening immediately post disaster. People demonstrated agency in creating and pursuing opportunities from thereon forward as the typology of opportunities and outcomes indicates (c.f., section 4.2). Some developed this agency to advance sustainability *because* of the disaster, i.e., the disaster experience catalyzed their inner urge to act. Others developed their agency *despite* the disaster, i.e., they continued their work despite the take over through central government, which limited opportunities to generate sweeping change. These people's agency indicates positive transformation in response to experiencing a traumatic event; in the words of a SCA, a member of the social service providers association:

> […] the earthquake experiences made us different people than we were before, because of the transformative impact of the disaster and recovery experience on an individual level: People confronted their mortality, but unlike in the usual cases where confronting your mortality is associated with a terminal illness, they have their lives ahead of them! (CC_54)

Such disaster related positive transformation and how to support it in favor of positive change is an area of disaster and resilience research that warrants more investigation (Brown & Westaway, 2011).

Appreciating the window of opportunity not as a one-time event, but as opening a series of consecutive events allows creating connection points among the sustainability initiatives and to link some of them with higher-level regimes. Conceptionally, this view links disaster recovery efforts to transition management approaches, as the sustainability initiatives in Christchurch reflect "initiative-based learning transitions". They start at the micro-scale, by actors who are driven by their sustainability visions, while actors'

rationality is bounded by the immediate environment and resource constraints. Actors use experiments to facilitate learning by doing, to shape pathways and respond to emergent processes. It is this unfolding nature that offers opportunities for ongoing intervention (Turnheim et al., 2015). Adopting this view of change "as an ongoing process, a stream of interactions, and a flow of situated initiatives" is considered key to overcoming implementation problems of change programs (Schensul, 2009, p.241, citing Tsoukas & Chia, 2002). Accounting for such a complex-adaptive systems view in the discourse of windows of opportunity is important because disaster recovery is a long-term process, taking place within other ongoing change processes, and SCAs realized they can't run that marathon at a sprinter's pace. Therefore, for the SCAs to be successful, it is key to understand the temporal scope of the whole recovery, to communicate transparently about it, to remain vigilant about ongoing contextual changes, and ready, while sustaining oneself and others over these periods. One SCA, working towards a sustainable local economy framework, recommended to store one's energy, while being patient and vigilant: "It is like poker: you wait until you really have a good hand and you see an investment and then: you put it all in." (CC_33)

The practices used across the set of SCAs shed light on the role of individual SCAs in connecting people to each other in order to unlock situations and build broad coalitions for sustainability. Looking back, a high-ranking city official emphasized the importance of people acting as connectors to support sustainability during recovery: "Never say no to funding this position" (CC_50). Another SCA, being the local delegate of the New Zealand state energy agency and involved in energy oriented sustainability initiatives noted that forgoing to fund more such positions created high opportunity costs,

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because sustainability initiatives could not be connected to the resources being offered and vice-versa:

> People from around the world are coming and asking: How can we help? And certainly in the sustainability space they end up giving up, because there is just hardly… I mean there is [the city's sustainability officer]. And [he] is fantastic! But he gets spread as thin as butter. So, you have lots of connections, but [lack] the ability to actually follow up on all of these projects. (CC_18)

Funding such a sustainability liaison has important practical implications for both, decision-makers and practitioners interested in sustainability and disaster recovery in normal and disaster-times. One SCA sold key stakeholders in government, industry, and civil society in NZ's two biggest cities, Christchurch and Auckland, on engaging in "collaborative solution making" to accelerate sustainable housing, even though only the constituencies of some of these stakeholders were affected by the disaster. His argument was:

> You guys need to solve it together. It is not to me, not to anyone, it is up to all of us to work out solutions. Both cities have the same problems, although one is in 'normal' and one 'post-disaster times.' (CC_10)

While the role of connectors or liaisons is well recognized for sustainability problem solving in normal times (Williams, 2002; Brundiers et al., 2013, Fischer & Newig, 2016), this research indicates that there is an equally important role for them in sustainability-oriented disaster recovery. Instituting and funding a sustainability liaison (one person or a unit) in a post-disaster context is essential to strengthen sustainability

initiatives by connecting them to incoming resources and by networking them into a movement, which helps help expand the operating space of sustainability.

The practices of SCAs also corroborate the proposals by Westley et al., 2013 (see table 8) by adapting them to disaster recovery specifically. The different phases of the post-disaster recovery require sustainability initiatives to employ different tactics, forms of collaboration, as well as power strategies over time, responding to the contextual features of each phase. It requires strong teams, which evolve over time, as different people have skills relevant for different phases. This provides some evidence to practitioners what to expect when navigating through the three phases of seeing, seizing and sustaining change over time and what practices may be employed; even though every disaster recovery is shaped by unique, place based features. Seeing opportunities is a mindset and mindsets can be trained (Dweck, 2014). Seeing opportunities for sustainability in a disaster context is easier when people have engaged with sustainability prior to the disaster, professionally or personally. The opportunity type 'Sustainability is Happening' is testament that sustainability efforts planned prior to a disaster are accelerated during recovery; even if they don't succeed with the first try. Considering the projected increase of future disasters (IPCC, 2012), investments in sustainability planning are well justified. Seizing opportunities is an ongoing process. In most cases, the recovery process will open and close windows, which can be seized in order to push and strengthen the sustainability initiative. Seizing opportunities requires persistence, vigilance and readiness to put it all in when the time is right. Seizing opportunities also requires awareness of and responsiveness to the various contextual factors related to disaster recovery and other development processes, including the formal and informal

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rules, which are enabling or hindering and the psycho¬social wellbeing of social groups, which translates into people's ability and willingness to engage and varies over time and across groups. Sustaining changes requires first that leaders and followers of change sustain themselves as the recovery processes occur over decades. The practices used by respondents to sustain themselves reflect approaches recommended in the literature of resilient leadership (Holroyd, 2015). Second, the initiative needs to be sustained by translating them into institutions and infrastructures. In addition to the practices used by respondents, this study recommends to utilize different forms of power in order to alleviate and transform draining power struggles into supportive power alliances. A first step for practitioners to build "power with" and "power to" is to find other SCAs— seasoned or aspiring ones—to know who to call and receive necessary peer support.

Conclusions

This study explored people's and organizations' efforts to leverage opportunities created by disaster to pursue change towards sustainability. Various changes across diverse daily activity fields (such as housing, caring, recreating, being mobile and more) have been pursued with different degrees of success, using opportunities that allow for incremental and transformative changes. One of the limiting factors was the power bestowed on individual people in leadership positions; the most prominent examples being the special powers given to the Minister of the earthquake recovery. While their decisions narrowed the operating space for the sustainability change agents, these change agents nevertheless continued to push for change towards sustainability. This speaks to the sustainability change agents' ability to adapt under adverse circumstances and not to them (Bottrell, 2009) and to continue their efforts long after the big, post-disaster window of opportunity has closed. Also, it sheds light on the role of individual leadership of all kinds in influencing governance and sustainability change processes. As the attrition of democracy during disaster recovery is well known, this study reaffirms the need to prepare now for disaster recovery, in particular related to strengthening sustainability visions in normal times as well as the leadership and governance arrangements that serves them.

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LEVERAGING DISASTERS FOR ACCELERATING CHANGE TOWARDS SUSTAINABILITY: EDUCATION AND CAPACITY BUILDING

Abstract

Urgent sustainability problems call for accelerated and transformational change. Disasters can provide opportunities for accelerating such change towards sustainability by eliminating the impediments of "normal times," but only if a new breed of change agents is able to seize these opportunities. However, current educational programs in sustainability and disaster risk management insufficiently prepare change agents for this challenging task. Recent reforms of curricula, institutional innovations, and actual experience from such change agents could be used to help design curricula that train students in seeing and seizing opportunities for change towards sustainability. These curricular changes will also need to more fully link sustainability and disaster risk management in ways that allow for educating this type of change agents.

Introduction

Urgent sustainability problems, such as climate change, loss of biodiversity, socio-economic polarizations, and urbanization in disaster-prone areas, are reaching critical tipping points that jeopardize a "safe and just operating space for humanity" (Rockström, et al., 2009; Raworth, 2012). Acknowledging a "world threatened by catastrophic increases in disaster risk," the United Nations calls for shifting from managing disasters to managing risks to disasters; in other words managing for sustainable development (UNISDR, 2015). Yet, to date, efforts to respond to the

challenges of sustainability, before it is too late to reverse adverse trends, have failed—

responses are too slow and do not match the urgency of the problems (Van der Leeuw et

al., 2012).

Disasters are recognized as catalysts of change (Birkmann et al., 2009). A disaster

results when a natural, technical, or social hazard impacts vulnerable conditions,

including strained ecosystems and societies (Wisner et al., 2004). Disasters are often

presented as forces that debilitate and paralyze affected communities. While these effects

are real, disasters also provide opportunities for accelerating change as compared to

"normal times" (Agrawal, 2011). As Schwab et al. (2014, p. 6) note "amid all the

frustrations and sorrows of post-disaster recovery, there are opportunities. The most

resilient communities are those with the civic mindset to seize on those opportunities to

create new visions for the future." Opportunities emerge from disasters because disasters

break, at least temporarily, entrenched path dependencies and inertia (Pelling & Dill,

2010). The destruction wrought by disasters is thought to create a blank slate, for

instance, for building houses and infrastructures from scratch. It also offers, ideally, a

"reset button" for social re-figurations to lessen vulnerabilities and enhance justice

(Agrawal, 2011; Oliver-Smith, 1996). The influx of media representatives, donors and

investors during and after disasters draws attention and political will to social,

environmental and economic issues that are unable to garner such support in normal

times (Epping-Jordan et al., 2015).

While disasters provide opportunities for change, the key question is who sees

and seizes these opportunities to accelerate what kind of change and for whom. Alliances

between corporate and state actors often utilize disasters to accelerate neoliberal interests,

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also described as "disaster capitalism" (Klein, 2007) and "second tsunami" (Wickramasinghe, 2005). Few accounts exist on how people and organizations are able to see and seize opportunities to accelerate change towards the public good and sustainability. Examples include the disaster recovery processes of the indigenous Tawahaka in Krausirpi, Honduras, post Hurricane Mitch (1998) (McSweeney & Coomes, 2011), the partnerships between non-governmental organizations and the Honduran communities Divina Providencia and Ciudad España, which were intentionally built for survivors of Hurricane Mitch (Alaniz, 2012), as well as the citizenry of Greensburg in Kansas, USA, post-tornado (Swearingen-White, 2010). Nevertheless, being able to see and seize opportunities for change towards sustainability becomes even more urgent because of unraveling sustainability problems as well as increasingly frequent extreme weather events (IPCC, 2012). As Schwab et al. emphasize

> while no one in their right mind would wish for such events to occur in order to achieve [sustainable] outcomes, a sober assessment of reality indicates that natural disasters will occur and that communities should be prepared to make something positive happen as a result. A crisis, as it has famously been said, is a terrible thing to waste. (Schwab et al., 2014, p.159-160)

The goal is to prepare for disaster recovery processes in order to accelerate changes towards reduced disaster risk, resilient communities, and other sustainable development goals (Berke & Campanella, 2006). However, achieving such goals requires people who are trained in leveraging disasters as opportunities for change. The American Planning Association stated in 2014 that many such professionals are called in terms of

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planning, but few are trained (Schwab et al., 2014) and this statement rings true also for disaster management and sustainability practitioners (Smith & Wenger, 2007).

Against this background, this study proposes to close the gap between the professional need and the available supply of expertise by proposing an approach for education and capacity building that could be integrated into sustainability programs in higher education institutions. The paper asks, how can change agents be trained in order to support their efforts to pursue change towards sustainability in the context of disasters? To answer this question, the analysis first provides a review of recent developments in education, and shows how the experience of disaster survival has triggered educational and institutional changes at universities in support of sustainability. These universities' achievements offer important lessons that can guide similar efforts of other universities in the future. Second, the manuscript reviews and synthesizes approaches to training sustainability change agents, drawing on secondary research in sustainability education and disaster risk management education, as well as on primary research that documented the experience of sustainability change agents working on the ground in disaster recovery in Christchurch, NZ and Aceh, Indonesia.

The paper is structured as follows. Section 2 briefly describes the methods used in this study and section 3 proceeds to review recent developments where the experience of surviving a disaster catalyzed universities to actively support change towards sustainability goals. Section 4 reviews current gaps in education for sustainability and disaster risk management related to building capacity to leverage disaster recovery to advance change towards sustainability. Sections 5 and 6 present proposed learning outcomes as well as pedagogical approaches and activities to develop these learning

outcomes. The paper concludes with practical implications for introducing such an educational proposal.

Method

This paper synthesizes evidence from primary and secondary research. The author conducted fieldwork between October 2014 and May 2015 in Indonesia (Province of Aceh as well as cities of Jakarta, Bandung, and Yogyakarta) and New Zealand (city of Christchurch) on the 2004 Indian Ocean Tsunami and the 2010-2012 series of earthquakes in Canterbury, respectively (Brundiers, 2016). The two cases were selected because in both locations, authorities and local leaders initially proclaimed their desires to leverage the disaster as opportunity for change towards sustainability. Nevertheless, in both circumstances the disaster recovery process has since been perceived as having generated controversial outcomes. Fieldwork consisted of semi-structured interviews with leaders of sustainability initiatives to explore how they pursued change towards sustainability in disaster contexts. Interviews are anonymized (as required through human subject research requirements) through a coding scheme (codes beginning with "RI" (Indonesia) refer to the Indonesian case study and codes with "CC" (Christchurch) refer to the New Zealand case study).

Learning From Programs That Advocated Change Towards Sustainability

Recent developments in disaster risk management programs in higher education offer two important suggestions for reforming sustainability programs in higher education

in order to increase the capacity of these programs to educate change agents on how to prepare, recognize, and seize post-disaster windows of opportunity for sustainability.

The first suggestion is to take a holistic and long-term view on disaster recovery, which corresponds well with a comprehensive sustainability perspective. An example is the "Center for Rebuilding Sustainable Communities after Disasters" at the University of Massachusetts in Boston, USA. The Center adopts a multidisciplinary approach and trains aspiring disaster managers in long-term and sustainability-oriented recovery. The program also engages in practical recovery projects with partner organizations. Another example of a holistic and applied-learning approach is the partnership between Lincoln University and the University of Canterbury, New Zealand, to collaboratively deliver the master program in disaster risk and resilience. The program aligns with international initiatives, including the Sendai Framework for Disaster Risk Reduction and the Rockefeller Foundation's 100 Resilient Cities program, in which the City of Christchurch participates. The program stresses the importance of being able to plan in advance in order to cope with disastrous events and to devise and implement suitable community engagement approaches in order to support communities efforts to prepare for, responding to and recover from major events. The concept of reference is resilience, which is indirectly linked to principles of sustainability (Scoop 2016).

The second suggestion is to learn from the change actions undertaken by students, faculty, and administrators of disaster-affected universities. In the midst of an unfolding disaster, members of these diverse groups identified opportunities to change their university's programming in support of local sustainable development goals. These individuals triggered a chain of events, leading to new courses, programs and changes to

institutional missions. I highlight three examples that can inform the design of curriculum to prepare students for sustainability-oriented disaster recovery (for additional examples see Back et al., 2012; Bai et al., 2012; Bowen et al., 2012; Perry et al., 2013).

The University of Canterbury in Christchurch, NZ, responded to the devastating 2010-2012 earthquakes with a novel program. Following suit on the groundbreaking work of the Student Volunteer Army, a leadership team developed an academic program to involve the university's students in a community-based disaster recovery experience (O'Steen & Perry, 2012). Moreover, to facilitate interactions among members of the university and the community, the university established the UC Community Engagement Hub. The program allows students to reflect on their academic learning and general belief systems as they engage in service-learning activities providing service to communities and grappling with the real-world problems of disaster recovery necessitating these projects in the first place. The service-learning experiences prepare students for collaborative efforts and help students acquire some competencies for post-disaster recovery; these are important building blocks for students' capacity to co-create with their community partners evidence-supported sustainability solution approaches to local development questions (c.f., Wiek & Kay, 2015).

The developments at the University of Canterbury were guided by the example of Tulane University, USA, which seized an opportunity for transformation presented by Hurricane Katrina (Berdahl et al., 2011). Tulane's president at the time stated:

amid this crisis came unexpected opportunities. For the city, the attention generated by Katrina brought resources and ideas to problems that had been too long ignored. For Tulane, the storm was equally important in raising strategic

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questions about the mission of the institution, its interdependence with the local community, and the role of universities in producing engaged citizens and future leaders. (Cowen & Cowen, 2010, p. 3)

Tulane shifted its emphasis from academic impact and international reach to positive local change through collaborative university-community partnerships. These addressed health care, education, housing, and public spaces, which constituted long-standing societal problems and injustices exacerbated through Hurricane Katrina. The changed university mission translated into new networks involving people from the university, the city and communities; research agendas and committees focusing on co-creating solutions; and a new curriculum on community-engagement for Tulane's students, offered through the new Center for Public Service. While these achievements are significant, a challenge is how Tulane will ensure students' continued engagement in disaster-related service-learning experiences as the recovery is now in its 10th year.

In Aceh, the northern province of the Indonesian island of Sumatra, the devastating Indian Ocean Tsunami from 2004 brought the opportunity for a peace agreement after more than 30 years of conflict. The peace agreement was leveraged to redefine laws, including those structuring the province's educational sector. From a social justice lens, this reform provided Aceh's educational system the opportunities to realize four goals: access to educational options; democratic representation of the local level (e.g., community boards); recognition of diversity (e.g., linguistic, religious, ethnic); and accounting for post-conflict recovery (Shah & Lopes Cardozo, 2014). With respect to preparing students for future disaster management and peace building, a new master degree in disaster management and two research centers were established. The latter

provided students from a diversity of backgrounds with applied research opportunities on sustainability and peace-related disaster recovery. Furthermore, a journalism school was built and is operated through the Aceh Chapter of the Indonesian Alliance of Independent Journalists. Informed by the disaster experience, the Aceh Chapter has also developed and adheres to an ethical code of conduct that reports about disasters in ethical, empathetic, and constructive ways. More recently, local researchers and municipal leaders joined forces and formed the "Sustainability Caucus" to collaboratively move sustainability policies and programs forward as part of the long-term recovery process. While Aceh failed to fully leverage the four educational opportunities and redress past inequities as well as actively build peaceful relations, Shah & Lopez Cardoso (2014, p. 10) consider it not too late "to promote a more transformative peacetime recovery for the province." Such ongoing disaster-recovery efforts exist; albeit on a small scale. These small-scale initiatives strengthen formal vocational education for youth especially in remote areas; involve youth in inter-ethnic activities and train youth in agricultural entrepreneurship in combination with positive-peace building practices or in political leadership and governance. These initiatives are carried out through partnerships among organizations of formal and informal education in order to leverage social learning for social transformation. Initial evidence by Brundiers (2016) also suggests that research-supported recovery projects, carried out through partnerships between international organizations, Indonesian Universities, and local counterparts, generated workable solutions in fields where most recovery projects commonly failed (e.g., mangrove reforestation, housing construction, mental health care). They also involved students as

participating observers, researchers, and translators. One sustainability change agent involved in the Aceh recovery deliberately used this approach to support his endeavors:

> Yes, this is my way. During my time at Aceh Green I have had five PhD students graduating from that process. We had 12 master students and more than 20 undergraduate students. They were working under the concept of attacking [sic!]. So, I invited the students asking: 'What do you want to do? Let it be justified through your academic institution.' Then we provided the facilities, technical assistant and so forth." (RI_28)

Internationally, there are increasing efforts of establishing research-supported collaborations involving scholars and practitioners from disaster management, sustainability, and resilience communities (e.g., UreX SRN). These collaborations provide great learning experiences for students, (e.g., research projects, internships) and its members could visit classrooms, sharing how they integrate disaster risk management and sustainability in their practices.

In sum, these examples illustrate the role of universities in enabling students to support disaster-affected communities in their disaster recovery efforts through service-learning and collaborative research projects. In the former, students provide service to local communities and use this experience to deepen their classroom learning. In the latter, students learn to collaborate with communities and employ theory and evidence to local development questions in support of co-creating solution approaches. Nevertheless, with the exemption of the Center for Reconstruction Sustainable Communities after Disaster at the University of Massachusetts at Boston, few programs have adopted a sustainability lens to frame disaster recovery projects and curricula development.

Current Gaps in Education for Sustainability and Disaster Risk Management

Current undergraduate and graduate programs in sustainability and disaster risk management insufficiently educate change agents for preparing, recognizing, and seizing opportunities for change towards sustainability in disaster recovery. This is due, at least in part, to a lack of collaboration and coordination between the fields of sustainability and disaster risk management, in practice, research, and education. Even advanced sustainability education is mostly concerned with educating for change towards sustainability in "normal" times (Lotz-Sisitka et al., 2015). Thus, aspiring sustainability professionals graduate with little experience of how to advance sustainability in times of crises or disasters and how to accelerate change towards sustainability during disaster recovery. Similarly, the integration of sustainability into disaster risk management education is only slowly moving forward (Kim & Olshansky, 2015). This is due to several factors. Disaster recovery represents the least studied phase of the disaster management cycle, and agreement on disaster recovery indicators is just emerging (Jordan & Javernick-Will, 2013). While research has addressed dimensions of sustainability-oriented recovery, it has not sufficiently developed an "understanding of how sustainable recovery can be achieved" (Smith & Wenger, 2007, p. 234). Thus, disaster risk management programs are often framed from an emergency management perspective, addressing "all hazards, all phases", while accounting for the role of context, key stakeholder groups, and special topics such as for instance, security or health (Cwiak, 2011; Kapucu, 2011; Alexander, 2013). Furthermore, a review of the syllabi available through FEMA's Emergency Management Institute website of the courses on hazards,

disasters and emergency management subjects offered by various colleges and universities, reveals that sustainability is rarely included.

A challenge for curriculum development is the lack of empirical case studies that compile the practical experience of organizations and leaders that accelerated sustainability during disaster recovery processes in their cities and regions. Thus, aspiring sustainability change agents lack the evidence-supported "thick descriptions" of leaders that successfully seized opportunities to help disaster-affected communities drive and shape the disaster recovery towards sustainability. However, synergistic opportunities are emerging as both sustainability and disaster risk management education emphasize creating active learning opportunities for students related to practitioners-academics relationships, defining competencies, seeking interdisciplinary collaboration and balancing education with training (Kim & Olshansky, 2015; Alexander, 2013).

Learning Outcomes: Competencies For Sustainability Change Agents

Leveraging disasters for accelerating change towards sustainability requires building capacity in future professionals to act as change agents for sustainability and support them in preparing for as well as recognizing and seizing opportunities for sustainability transitions (Myers & Beringer, 2010; Barth, 2014), because, as Schwab et al. write, "seizing opportunities is not a role for the timid or the unprepared" (Schwab et al., 2014, p. 159). Building capacity starts with identifying the competencies needed for sustainability-oriented disaster recovery and translating them into learning outcomes of a curriculum. To this end, this section presents a synthesis of skills needed as reported by change agents working on the ground and in the pertinent educational literatures.

In hindsight of the recovery from the 2010-2012 earthquakes in Christchurch, New Zealand, one of the change agents reflected on the key trait of being able to seize opportunities for sustainability:

You need actually people who act as a catalyst. […] there are lots of discussions going on but few people can act as a catalyst to turn words into actions on the ground. So there were huge airings of ideas, but not many people who would be working on how do these ideas get translated into actions on the ground. (CC_36)

Yet, the capacity to seize such opportunities depends on other skills. Schwab et al. (2014, p. 11) highlight the role of being able and willing to prepare for recovery prior to the disaster: "[p]lanning after disaster strikes can still yield important sustainability achievements by […] taking advantage of post-disaster opportunities to transform and thrive. […] However, the biggest challenge to such planning is the compressed timeframe."

Therefore, anticipatory competence is another trait of change agents. Berke and Campanella (2006, p. 193) state: a "community should be ready with solutions when a window opens [...] To take advantage of an open window, a community should have a recovery plan in place long before disaster strikes." Additionally, Schwab et al. (2014, p. 160) assert it is "critical to begin to evaluate those possibilities beforehand, in order to expedite and maximize the chances of success when they arise." Failing to provide future-oriented guidance creates undesired consequences, especially for sustainability as one expert involved in the recovery in Aceh after the 2004 Indian Ocean Tsunami reflected "if there are no signals of where the development will be, then people start to taking their own directions." (RI_11) In Aceh, there was little opportunity to anticipate

change pre-disaster. Thus, the role of creating a vision and using it to build trust and a sense for direction is augmented, as one of the change agents in Aceh emphasized:

> You need to prepare the platform for uncertainties to become certainties for the way forward. You need to have a good vision for the corridor through which you will navigate your project. ... Bringing all the visions together is a constant negotiation process. (RI_68)

Anticipation links to the skills of reflection and collective learning. Again, in the context of the recovery from the 2010-2012 earthquakes in Christchurch, one of the change agents stated "in a time of disaster, it is very hard to be reflective. [...] [Reflection] needs to happen before. And you need to learn from others how to do this." (CC-_10)

Seizing opportunities for change towards sustainability is not an individual effort but a collective and coordinated one. Change agents, therefore, need to be able to build "strategic agency" – networks of committed and capable stakeholders (Westley et al., 2013). A change agent, working for the province of Aceh reflected on the role of these networks for the recovery from the 2004 Indian Ocean Tsunami: "In every department I try to find somebody. That is my personal strategy: to make connections with people who share the same vision as me: how to make a better life and better systems." (RI_23)

From this initial compilation of critical skills, the vision of a new breed of sustainability and disaster management professionals emerges. In "normal" times, these professionals collaborate with communities and other stakeholders in order to move sustainability forward, including anticipating possible disasters and contributing to the development of recovery plans that incorporate sustainability and resilience goals

(Schwab et al., 2014; Institute of Medicine, 2015). During this process, they build the foundations for post-disaster recovery towards sustainability. The foundations include the sustainability visions, specific plans and social relationships necessary to make progress towards both. The process starts at the same time and in parallel to the emergency response and blends in its later years into normal time developments. Ideally, the process is conceived of as a long-term sustainability transition, striving to create transformational change (not merely change at the margins) and using windows of opportunity to help create the related new governance systems (Westley et al., 2013).

To derive a comprehensive and specific set of competencies for this new breed of change agents capable of seizing opportunities presented by disasters, the literatures on sustainability and disaster risk management education respectively can be integrated as they complement each other. Table 9 links the competencies for sustainability change agents (Wiek et al., 2011; Barth, 2014; left column) with the competencies for disaster risk management professionals aiming to advance change towards sustainability and resilience during disaster recovery (right column). The latter competencies are derived from (i) my own empirical research on change agents involved in the disaster recoveries in Christchurch, NZ and Aceh, RI (Brundiers, 2016) and from (ii) literature in disaster accounting for the concept of "windows of opportunity" and normative concepts related to building back better or sustainability (c.f., Westley et al., 2013; Schwab et al., 2014; Berke & Campanella, 2006) as well as from (iii) literature in disaster risk management education (McNaughton et al., 2015; Cwiak, 2011; Kapucu, 2011; Alexander, 2013).

Table 9

Overview Of Competencies For Sustainability Change Agents

In Sustainability Edu	← Systems Thinking →	Disaster Risk Management Edu
The ability to collaboratively understand the intermediate and root causes of sustainability problems as well as the systemic impact of solutions to them.	The ability to • Perceive city as a system of systems, resilience exists in diverse levels • Elicit and process facts, statistics, reliable information on current state • Find biases or flawed assumptions in the analysis of a problem Source: Schwab et al., 2014	

Unless you are lucky enough to have in your network a whole lot of different people who know how to work the different parts of the system, getting anything pulled off is really hard. (CC_35)

You need […] to see what is there and can be used for […] producing food, tools, health, and economic activities. If you don't have the ability to see these things that are available to you, then the easiest thing is to pour everything inside, imported from all over the world. (RI_75)

In Sustainability Edu	← Futures Thinking →	Disaster Risk Management Edu
The ability to collaboratively anticipate the future (scenarios) and to craft shared visions informed by sustainability principles.	The ability to • Craft a vision for the future after a disaster • Employ foresight, scenario planning and visualization	

So, when you have this profound opportunity to change the world, people don't dream big enough. (CC_35)

For the city to recover it needs a vision […]. Until there is something, people will hold on to and people will be looking back. If you don't know where you are going, you stay, because it's safer. (CC_20)

People felt it needs already so much resources and energy to build back to normal, how can one built back better and even towards sustainable development. But for us, for the environmentalists and social workers, the tsunami was the big opportunity of the time – it was the opportunity to mainstream all our ideas into the new development agenda! (RI_63)

In Sustainability Edu	← Values Thinking →	Disaster Risk Management Edu
The ability to collaboratively use concepts of justice, equity, socio-ecological integrity, and ethics to inform current-state assessments, visions, and strategies for change (incl. trade-offs).	The ability to • Consider long-term resilience also in short-term recovery plans to promote a socially just, economically viable, and environmental compatible development that is less vulnerable to hazards • Think positively, recognize benefits, solutions, new possibilities • Assess a situation for possible drawbacks and explore downsides • Provide and use a direction-setting framework and goals • Be brave, act ethically; mediate between competing realities and priorities	

This is another key element: being value-driven. […] It's about key people, […] who are driven by their values, that is, their socially minded values. And they have the skillset to harness that. (CC_36)

If you have not thought about the [sustainability] principles prior to the disaster, you can't think of them on the day of recovery, so a principled recovery does not happen. (CC_2)

We emphasized peace over sustainability on the ground. There is a price that you have to pay. The price for peace was that we followed what the community wanted – to avoid escalation of the opposition. […] Due to this emphasis, we maybe re-established some path-dependencies. (RI_68)

We use the 'village of care' approach. [...] To facilitate inter-tribal or inter-ethnic dialogue, we have set up a forum. […] The forum is a place to realize that regardless of the ethnic group you are from, you share some core values with people who belong to other ethnic groups. (RI_70)

In Sustainability Edu	← **Strategic Thinking** →	Disaster Risk Management Edu
The ability to collaboratively design and implement sophisticated solutions to address sustainability problems.	The ability to • Think creatively, employ novel or unusual remedies to a problem • Embrace opportunity, try to be flexible and adapt • Support institutional learning, help build a sustainable recovery management framework, including a recovery management organization and recovery plan • Prepare and mobilize for change, embrace diverse ideas, co-create innovation • Seize windows of opportunity	

What happened after the earthquakes has stemmed from that [climate-smart] strategy. We were saying to the council: 'We already have the policy in place. So let's go and deliver on it. This is a bigger opportunity to make change happen. Yes, it is a disaster, but it is also an opportunity'. (CC_10)

To seize a window-of-opportunity you need to: always be fast and make it fast; show that you do something, while you are still making your proposal; don't worry about mistakes – every morning, mistakes will knock at your door. By the evening you have to resolve them; document everything you do—don't miss any opportunity to learn. (RI_68)

If something on the ground changes, the organization and its structure had to change in order to respond to it. It was a very important design element of the organization to continuously change in order to adapt to the quickly changing environment around them. (RI_57)

In Sustainability Edu	←**Interpersonal Competence**→	Disaster Risk Management Edu
All previous competencies require skills to communicate and collaborate with members of diverse communities. These skills also include e.g., self-care, empathy, joint learning, conflict resolution, teamwork, project management.	The ability to • Develop organizational relationships and foster cross-sector coordination and • Develop emotional intelligence; think intuitively, respond positively and empathetically • Represent a "big picture" of the community to illustrate diversity • Facilitate leadership, collaboration and public participation to create buy-in for the adoption of plans • Build trust, legitimacy, and social capital (bonding, bridging, linking) • Facilitate conflict resolution and negotiations • Lead with empathy, support teams, and prioritize self-care	

Our approach is exploratory and introspective; if you are not open to seeing through different eyes, then you are at risk of staying stagnant. (CC_20)

We were lucky because we found each other and we gave each other the peer support that we needed (CC_35)

It's about a deep and authentic engagement and interaction that we have with people and that is necessarily a slow process, because it is done as a one-on-one or one-on-two process. But over time, the energy it builds up is very deep. (CC_36)

We had to find that middle ground, where we had the trust of people but also of the agencies. […] you have to be seen to not be in anybody's camp. (CC_41)

Sometimes it is good to have a broker that sits in between. So, don't say no to funding that layer of brokerage. (CC_50)

A key aspect of success is not to elevate yourself, but to elevate others. You need to elevate many more others. (RI_68)

We started to use the criticism as a positive input [for learning]. […] Everyone was invited to join this forum and criticize us (RI_80).

Designing Educational Pathways for Change Agents in Existing Programs

The competencies presented in Table 9 define the learning outcomes for the educational activities along the educational pathway of a degree program. In the following, I propose a set of guidelines for designing educational pathways that allow students to acquire sustainability-oriented recovery competencies in normal and disaster times, and to do so in collaboration with project partners. These guidelines resonate with educational programs in sustainability and disaster risk management, because both emphasize the role of hands-on learning, linking theory to practice and enabling students to collaborate with professionals in order to co-create solutions. Kim and Olshansky (2015, p. 292) encourage the use of applied learning in normal and in post-disaster times, arguing that translating "the theories, tools, and practices for recovery planning into the classroom, field schools, design charrettes, and resettlement camps would provide further learning opportunities for building back better."

The proposed guidelines are just an open proposal. At this time, they do not define a degree level or the composition of students. Nevertheless, the master's level seems appropriate for advanced learning, as students will have to integrate diverse specialist knowledge areas into the process of leveraging disaster recovery for sustainability and liaise with the participants of the community of practice in order to translate these concepts into practical and feasible actions (Alexander, 2013).

Guideline 1: Design educational experiences that enable students to acquire critical competencies during normal times as well as during disaster times. Classroom-based activities such as simulations, including role-plays and scenario development, have been successfully used in disaster risk management education in order to prepare students

for their engagement during disasters response and recovery (c.f., Alexander, 2000). Yet, simulations, regardless of their sophistication, cannot replace actual disaster recovery experiences. Through field trips, interviews, shadowing, service-learning, and other forms of case-encounters, students gain critical insights into disaster recovery processes (Selby & Kagawa, 2014). These activities can be employed in normal and disaster times (O'Steen & Perry, 2012).

Guideline 2: Design educational experiences that enable students to acquire critical competencies through real-world, hands-on recovery *projects*. Project-based learning offers various and complementary advantages compared to classroom-based education. Ideally conducted in collaboration with non-academic stakeholders, these experiential learning environments extend beyond cognitive capacity and also build affective, practical, and collaborative skills (Perry et al., 2013; Brundiers & Wiek, 2013).

Guideline 3: Design educational experiences that enable students to frame their projects in the context of sustainability-oriented, long-term disaster recovery. Students learn to frame their projects using the long-term perspective of disaster recovery and normative perspective of sustainability in order to explore how disaster-prone and unsustainable states and practices could be transformed through sustainable development, including reductions of risks and vulnerabilities. This perspective of navigating long term sustainability transitions extends the common focus in standard disaster management programs on managing emergency response (Schwab et al., 2014).

Figure 12 offers a model that illustrates how these guidelines can be integrated into an educational pathway that progressively builds students' capacities to work in and with real-world contexts, project partners, and affected communities (Brundiers et al.,

2010). Some of the compiled activities of this model and their progressive sequencing are also effectively employed in disaster management education (Alexander, 2000; Alexander, 2013) and recommended in the UN Technical Guidance for Integrating Disaster Risk Reduction in the School Curriculum (Selby & Kagawa, 2014).

Visiting the world
- Immerse students into real-world recovery processes through field visits
- Students interview and shadow post-disaster change agents in their professional and civic environments

During 'normal' and disaster times

Bringing the world in
- Guest speakers share their experience of preparing, recognizing, and seizing post-disaster opportunities for change towards sustainability
- Students watch videos and listen to stories of sustain-ability-oriented disaster recovery processes
- Students participate in a network of disaster recovery experts

During 'normal' times

Engaging with the world
- Students provide services to recovery change agents*
- Collaborative partnerships with stakeholders to develop plans and structures for post-disaster recovery*
- Collaborative partnerships with recovery change agents to implement plans and utilize structures for post-disaster recovery*

During 'normal' and disaster times

Simulating the world
- Scenario explorations of recovery processes towards sustainability
- Designing and pre-testing sustainability-oriented recovery interventions*

During 'normal' times

Additional skill building activities:
- Teamwork
- Stakeholder engagement
- Caring self-management

Note: Activities marked with an asterisk (*) should be offered as a full (new) course. The other activities can be offered as a component of existing courses.

Figure 12. Educational pathways for learning how to leverage sustainability in normal and disaster times.

In the first stage of the program, i.e., "Bringing the World In," activities in the classroom help prepare students to get a sense of the disaster context and related recovery efforts. These exercises in building empathy ask: How might it feel to be in that situation? Students watch videos, listen to stories of disaster experiences and read accounts of positive changes realized during and because of disasters. To date, only a few

attempts exist that analyze and document positive cases of populations that seized opportunities for change towards sustainability (e.g., Solnit, 2009; Trustrum, 2014; Brundiers, 2016). Guest speakers are invited to class and engage students by sharing their personal experience of preparing for and seizing opportunities for change towards sustainability in the context of a disaster. These activities lay the foundation for students to become part of a community of practice, a network of social learning and reflection (Wenger, 1998).

Next, students "Visit the World" during normal and disaster times through activities outside of the classroom, such as surveys and mapping, as well as fieldtrips to and internships/service-learning projects with organizations engaged with disaster risk management, sustainability, or resilience. In this process, students reflect how these organizations in general, and their projects specifically, address sustainability, how a disaster could impact the organization and its programs and projects, and what could be done now in order to enable the organization to accelerate change towards sustainability, including during the aftermath of a disaster. Fostering social learning about recognizing and conceptualizing such opportunities ("seeing opportunities") is one of the normal times practices of a change agent involved in Christchurch's earthquake recovery:

> What we try to do is to show people the way to understand the opportunities. […]
> When you are thinking about a building, creating a new community system, or
> policy or whatever it is… —what are all the opportunities that are linked? You
> might not capture all of them; you might not even do them! But at least
> understand what they are. (CC_10)

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Students "visit the world" in their own city to become part of the local community of practice. They may choose to participate in study-abroad programs to contribute to disaster recovery efforts in other places (c.f., Perry et al., 2013).

"Doing a test-run" is an important condition to accelerate change towards sustainability in post-disaster contexts, stated a sustainability change agent involved in the Christchurch recovery (CC_40). "Doing a test-run" translates into surrogate experiential learning that "simulates the world" through classroom activities such as role-plays, simulation gaming, collaborative decision-making games, and scenario analysis. The activities simulate a situation that reflects conditions of the disaster context e.g., compressed timeframes, speed overruling quality considerations, uncertainty about facts and decision-making procedures, retraction of democracy and related processes, societal grieving and bonding (Alexander, 2000; Love & Vallance, 2013). Students adopt a role and collaborate with others in order to conceive of, design and implement an intervention that accelerates change towards sustainability in the midst of a simulated disaster context. Instructors unexpectedly change parameters such as reducing available time, providing new information, or failing to deliver promised resources (Alexander, 2000). Students could test their intervention using modeling or an extended peer-review process (Funtowicz & Ravetz, 1993), inviting academic, non-academic and laymen experts to evaluate the effectiveness and efficiency of their proposed intervention.

Through these preparatory activities students can lay important foundations for potentially seizing opportunities during disaster times. These foundations include first building social capital: students participate in a community of practice (Wenger, 1998), which involves people from sustainability and disaster risk management across academia,

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civil society, business and government. Second, through their projects, students engage in collaborations with partners around ongoing projects and meet the constituencies or intended user-groups of these projects. This allows them to employ methods for participatory planning in normal and disaster times. Furthermore, students are able to develop insights into how the ongoing projects and proposed interventions in normal times could work as stepping-stones to collaboratively build resilience and advance sustainability in disaster times, too. For one change agent in Christchurch, such foundations were a precondition for his ability to seize opportunities after the Christchurch earthquakes. He summarized the foundations as follows (author's highlights in italic): "so, if you don't have a good *framework*, if you haven't got the *relationships* before the disaster, if you don't have *community capacity* before the disaster, you certainly don't get it because of the disaster." (CC_10)

Once these foundations are in place, further activities aimed at potentially accelerating change towards sustainability post-disaster can start in order to prepare pre-disaster for sustainable post-disaster activities, even without being able to know how exactly it will contribute to that: "Start now: even if you don't know exactly what to do and how things will play out, start seeding the ideas and developing the social infrastructures." (CC_40)

Together, these foundations enable students now to "Engage with the World": to co-create evidence-supported sustainability solutions with their community partners. For instance, students could engage with project partners and stakeholders in co-creating sustainability development plans and collaborative structures for disaster recovery or even to collaboratively implement the plans and utilize these structures for and during

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disaster recovery. In order to be able to co-create solutions with disaster-affected people in Aceh, one of the change agents of the 2004 Indian Ocean Tsunami emphasized the need for an ethnographic approach: he moved with his family from Jakarta to the totally destroyed Banda Aceh and strove to embrace the environment he lived in order to build "everyday actions of trust." On this basis he later met with the villagers at their sites:

> to discuss their plan, introducing some kind of scenario-planning in the sense that we discussed 'what-if questions'. For instance: You did not have a health clinic before and you have not planned for one. You don't want one? Oh, you do want one—where would it be built? (RI_68)

Designing and engaging in such collaborative courses is known to be challenging for all parties involved in normal times. It requires a shift in teaching and learning habits, mutual learning with diverse communities of practice, agreement on educational and real-world outcomes, as well as adjustments of academic schedules and rewards (Evans et al., 2015). Doing such courses is even more challenging in disaster times, as students' need for affective and emotional learning is augmented, which not all instructors are trained in Affective and emotional learning incorporates psychosocial elements in order to support students in addressing and processing their feelings and emotions in individual and collective ways (Shelby & Kagawa, 2014).

Considering these challenges, Perry and colleagues (2013, p. 53-54) stress that preparation "is vital to success, because when future disastrous events present themselves, there is not much time to plan or think through complexities. […] Resources like these need to be readily available and conversations for preparedness must begin

today." Such were also the thoughts of one of the change agents working during the

disaster recovery process in Aceh for one the oldest and second largest Islamic

organization in Indonesia (Muhammadiyah), which is devoted to supporting social and

educational causes (RI_75). Drawing on her experiences in Aceh, this change agent

became part of a group that inspired the Muhammadiyah to map out a research and

educational plan related to disaster risk management in anticipation of future disasters.

This plan outlines activities for students for all degree programs of the higher education

institutions collaborating with Muhammadiyah: for instance medical students serve as

assistants to the medical team in normal times to help set up the structures for disaster

response times.

Practical Implications

Educational leaders urge us to "lean toward the disaster, not shy away from it" in

order to educate change agents for sustainable development (Perry et al., 2013, p. 43).

This implies that universities need to extend their concept of disaster preparedness.

Beyond emergency management plans, this expanded concept of disaster preparedness

includes institutional and curricular preparedness to support the community, of which the

university is a part of, in their sustainability-oriented and long-term disaster recovery

efforts.

The time is ripe to realize the complementarities and synergies between

sustainability education and disaster risk management education in terms of learning

outcomes (sustainability competencies) and pedagogical approaches (applied and

collaborative learning) to achieve these outcomes. Such integrated courses would allow

sustainability students to build their capacity to supporting change towards sustainability in normal and disaster times. Obviously, these courses are not a panacea; they help build capacity, yet the educational approach is no guarantee that graduates will be able to act on their capacities in the event of a disaster.

There are various entry points to make first steps in the direction of developing new curricula that links sustainability and disaster risk management education in order to train students in leveraging opportunities created by disaster for change towards sustainability. Below I highlight some first steps, which seem applicable to the context of North America and Europe, acknowledging that the adoption of the proposed pathway needs to account for the cultural context related to learning and the societal role of educational institutions. Institutionally, exchanges between scholars and practitioners from both fields could be initiated between the American Association of Sustainability in Higher Education (AASHE) and FEMA's annual symposium on higher education in emergency management. On the level of the university, campus operations and facilities management are interested in combining their campus sustainability efforts with efforts to increase campus disaster resilience. Students could help inform these efforts through their academic assignments and coursework. The university's sustainability coordinator could in the future help connect campus operations and facilities staff with faculty in order to create such collaborative projects as part of the campus living lab movement (Robinson et al. 2013). This idea of using the campus as a living lab is now also increasingly transferred to cities. In cities, it is realized through participatory collaborations between academics (faculty and students), municipalities and other societal stakeholders who jointly strive to co-create sustainable solutions to urban

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development challenges, including disaster resilience and climate change impacts (Evans et al., 2015). The idea of living labs have also been successfully employed in disaster recovery and reconstruction, in fields such as renewable energy production (Micangeli et al., 2013), livelihoods based on organic agriculture and eco-tourism (Abramson & Qi, 2011), and housing (Pribadi et al., 2014). Living labs use pilot projects to co-create and test potential solution approaches and contextualize them before they are potentially scaled. This iterative process of experimenting, learning, and improving approaches provides important benefits for the university and the city and disaster-affected place, respectively. For the university, it offers a pipeline for student projects through which students can develop their sustainability change agent skills for sustainability-oriented long-term disaster recovery. For the city it offers an opportunity to bring diverse departments together (e.g., planning, emergency management, and sustainability) and develop a basis for cross-departmental and cross-cultural collaboration (Evans et al., 20115). Thus, the efforts to offer students educational pathways for developing sustainability change agents skills, which they can apply in normal and disaster times, would also address the "fundamental disconnects between the research, academic, and practitioner communities" in disaster recovery (Rubin, 2016).

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CONCLUSIONS

Building off the premise that disasters create opportunities for change, this study set out to learn how people and organizations were able to see and seize opportunities for change towards sustainability in the midst of devastation and loss wrought by disaster. The study pursued four main questions: 1) What changes towards sustainability were pursued in the aftermath of disaster and to what extent do these changes represent progress towards sustainability? (2) How were people (and their organizations) able to pursue change towards sustainability in the context of disasters: who were the actors and what were their actions, tactics, and resources? (3) What can be learned about pivotal factors for success or failure for seeing and seizing opportunities for change towards sustainability in disaster contexts and about sustaining those introduced changes over time? (4) How can change agents be trained in order to support their efforts to pursue change towards sustainability in the context of disasters?

To address these questions, I developed a theoretical framework (chapter 1), which allowed analyzing, comparing, and appraising the sustainability change processes across disaster contexts as well as identifying and analyzing the people and organizations attempting to seize opportunities for change towards sustainability in disaster contexts. In the remainder of this section, I use the term "Sustainability Change Agents" as shorthand for this group of people. I applied the framework to a few secondary case studies documented in the literature (chapter 1) and to conduct empirical research in Aceh, Indonesia (chapter 2) and Christchurch, New Zealand (chapter 3). Drawing on the insights gained from the research, I synthesized empirical and secondary data into an

educational proposal, aimed to help build capacity for sustainability change agents

working in normal and disaster times (chapter 4).

Presenting the framework and the results emerging from my work during my

fieldwork and at the end of my research in Aceh and Christchurch also revealed

interesting insights about the practical utility of the framework for the disaster

management and planning communities, as well as for community-driven sustainability

initiatives.

Perceived Practical Uses Of The Framework And Its Components

My communication with practitioners who attended these presentations suggested

to me that they would be able to use the framework and its components as tools that

inspire their thinking around leveraging sustainability during disaster recovery.[39] For

instance, the framework reinforced the idea that ordinary people as well as practitioners

working for development, disaster management, or humanitarian organizations have the

option to make a deliberate choice for the pathway forward in a disaster situation or as

part of their disaster preparedness efforts. One participant, working for a major INGO,

remarked that as an INGO they have a choice to embark onto a sustainability pathway

from the moment when they attempt to impose their organization's standard practice that

[39] Communications refers here to public meetings hosted during fieldwork (2015) to share emerging
insights and at the end of the dissertation research to share research results (2016). In Christchurch, NZ,
these include: Public meetings hosted by Sustainable Otautahi Christchurch on April 16, 2015; September
15 and 16, 2016 as well as public lectures hosted by the University of Canterbury on March 9, 2015, and
September 9, 2016. In Indonesia, these included: Public meeting hosted by the Australian Indonesian
Facility for Disaster Reduction (AIFDR) in Jakarta (April 30, 2015); Public lecture hosted by the Tsunami
Disaster Mitigation Research Center (May 7, 2015); Internal meeting hosted by the Bappeda Kota Banda
Aceh/Development Planning Agency of Banda Aceh Municipality (May 8, 2015), and a public meeting
hosted by UNOCHA in Jakarta on September 9, 2016.

proved successful elsewhere; the key towards a sustainability pathway is to sincerely engage with the local context (AIFDR, 2015). At the same meeting, another participant remarked that the framework prompted her to think about the opportunities that arise for places unaffected by a disaster when some other place is having a disaster. For instance, she asked, in the wake of the Nepal Earthquakes 2015 what are the opportunities for Indonesia or Jakarta right now to learn from Nepal right now to review her organizations own processes or produce new processes conducive to sustainability? A third participant mentioned that the framework clearly reminded him that there are not just negative opportunities as presented in Naomi Klein's (2008) book on disaster capitalism; on the contrary people seize positive opportunities, too. The participants' statements underscored the concept of having a choice and were clearly linked to notions of agency, which combines diverse elements including a sense of self-efficacy, empowerment, optimism, self-esteem, innovative thinking, decision-making, and perceptions (Brown & Westaway, 2011). The disaster managers expressed their own sense of agency by identifying decision-points, ways to innovate on their practices, and feeling invigorated (enabled) by these thoughts. The statement of the first participant also acknowledged the agency held by disaster-affected populations and the responsibility of non-governmental organizations to help leverage this locally held agency through a "sincere engagement with the local context."

In addition to having a choice of doing things differently from the past and feeling capable to try to change, the vision of an alternative world guides choices and directs movement along the pathway. Engaging inclusive visioning processes should be good practice in normal times (Berke, 2002) as well as be a part of preparing for sustainable

disaster recovery so that the community has visions for the future before disaster strikes and is "ready with solutions when a window opens" (Berke & Campanella, 2007). In the absence of pre-disaster visioning and subsequent planning processes, opportunities can still be seized (Institute of Medicine, 2015), albeit to a lesser degree as one respondent of this study concludes: "So, when you have this profound opportunity to change the world, people don't dream big enough. I am really proud of the things that [we] have achieved during the rebuild. I also think that there is heaps more that could have been achieved, if we would have dreamed bigger and more daringly" (CC_35). While the framework draws helps focus on the post-disaster time, when key decisions can be made it could be improved to better account for the role of visions in informing these post-disaster decisions in the first place.

Sharing the framework also revealed how scholars and stakeholders distinguished temporal perspectives to identify possible avenues of collaboration in support of change towards sustainability. As the framework accounts for the contexts before, during, and after disaster, it helped to parse out when, where, and why post-disaster change processes originated. Interview respondents often utilized this triage to put post-disaster changes in their historic context. One reason for taking this distinct temporal perspective was that they had observed how the public often mixed up the origins of post-disaster changes, putting the blame for negatively perceived changes on those actors working post-disaster, although the roots of many post-disaster change go back further (CC_54, CC_47). Respondents noted that when people placed blame on others, they also placed the responsibility on these actors to resolve problems or lead sustainability initiatives. This transfer of responsibility increased these people's sense of powerlessness and victimhood

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and diminished their sense of agency. Another reason why respondents adopted an extended temporal perspective was that it allowed recognizing partners that supported change towards sustainability in the past (normal times) and who might be willing and able to continue their support even tough these partners are not directly involved in disaster recovery activities. Identifying partners beyond the actors immediately involved in the disaster arena is important in order to link the "practical matters" of disaster recovery to "broad policy opportunities" unrelated to disaster recovery, yet important for development (Schwab et al., 2014). Identifying this link between disaster recovery and development allows identifying available funding and support, in particular federal assistance available through departments whose nature already accounts for sustainability such as community development, finance, as well as parks and recreation, to leverage disaster recovery for long-term sustainability goals (Smith & Wenger, 2007).

Broad categories of the framework allow adaptation to local contexts. The *categories* of the framework are broad and proved to be adaptable to diverse contexts. For instance, the framework resonated well with the team at the Tsunami Disaster Mitigation Research Center in Aceh. This team concluded a multi-year assessment of disaster recovery 10 years after the 2004 tsunami disaster in Aceh employing a multi-disciplinary perspective. The categories of the framework allowed the team to integrate and synthesize the findings of their five sub-teams.[40] Similarly, the framework resonated

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[40] The sub-teams worked on: Reconstruction of human settlement and infrastructure of the affected area; Regional and communities' economic revitalization; Mental health & psychosocial; Disaster management efforts; Community preparedness.

with NGOs and agency officials in Christchurch because they considered the approach to record changes affecting daily life along the range of daily activity fields as an inclusive and tangible way to engage a participatory discourse about sustainability; its desired goals and current directions. This suggests that the application of the framework fulfilled a similar purpose for the scholars in Aceh and the community stakeholders in Christchurch: to integrate diverse findings into a comprehensive cross-sectoral perception of change in society. As shown in chapters two and three, many Sustainability Change Agents focused on specific goals related to a specific daily activity field, which informed their perspective and their rationality (Simon, 1957), leading to potentially narrow and myopic views. They often did not have the freedom and liberty to step back and look at things in a broader, comprehensive, view.

The *sustainability appraisal tool* was valued as its sustainability principles and criteria connect with locally relevant sustainability guidelines, such as the Health in All Policies sustainability outcomes employed in Christchurch, New Zealand, or the United Nation's Sustainable Development Goals, which some disaster management and humanitarian agencies in Indonesia are preparing to incorporate into their work. Furthermore, the appraisal explicitly addressed whether changes were moving towards sustainability or not. Answers to this question opened the prospect for ongoing adjustments in investments and development processes. This is important as the time of measuring success or failure often occurs at the end of the government-led disaster recovery process and implies the end of government finance for recovery. In contrast, addressing the recovery and development needs require longer-term time frames and a pathways approach in order to take decisions towards desired sustainability outcomes,

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while accounting for the current situation, where vested interests, diverse values, inertia, and concurrent processes intersect, shaping the decision space (Wise et al., 2014).

Having reviewed the practical utility of the framework for the disaster management and planning communities as well as community-driven sustainability initiatives, the next sections reflect on the summative answers to the remaining research questions.

Sustainability Appraisal: Mixed Results Indicating Transitions in the Making

This section reflects on the results related to research question 1: What changes towards sustainability were pursued in the aftermath of disasters, and to what extent do these changes represent progress towards sustainability?

Mixed results indicating transformative capacity and emerging collective resilience. The results of the sustainability appraisal presented in chapters 2 and 3, indicate that in both cases, fairly little net positive progress towards sustainability was made. This net progress is the result of both changes intending to increase sustainability and changes decreasing sustainability. Changes towards sustainability were endeavored in almost all daily activity fields and sustainability principles, respectively, with some daily activity fields and principles receiving more attention than others; e.g., prominent daily activity fields in Christchurch included engaging in governance and caring related to health care, insurance and the environment whereas housing and working were prominent in Aceh. The negative changes mostly originated in contextual features, such as a disaster recovery approach led by central government and the insurance sector

(Christchurch, NZ) and disaster recovery approach in Aceh (RI), which unequally accounted for the recovery of tsunami and conflict survivors. These mixed results indicate at first sight a lack of transformative change towards sustainability. Nevertheless, they also indicate that transformation is not a linear process resulting in clearly visible outcomes across the board. Rather, transformation occurs over years and decades in forms of convoluted processes, with some elements of change moving faster and in more direct ways than others. In this view, the mixed changes also indicate that clearly, efforts towards sustainability were and are pursued, despite contextual circumstances unsupportive of these efforts. These ongoing efforts suggest that renewed attempts for continuing the change processes.

Adopting the lens proposed by Brown & Westaway (2011), these endeavors of changes towards sustainability that respondents identified as being few and far between can be interpreted as indicators of emerging collective resilience and individual transformative capacity. Individual transformative capacity is manifest in the relentless efforts of those SCAs, who continued to pursue sustainability initiatives despite adverse circumstances, which in Aceh and Christchurch often referred to the lack of political support of sustainability issues in general. The sustainability initiatives can be perceived as collective resilience if they will be able find ways to collaborate more and work synergistically. Adopting such a human resilience lens allows seeing these individual and potentially collective responses to disaster recovery as a form of positive adaptation and resistance. This is in contrast to those disaster responses, where people give in to pressures and start to "positively adapt to adversity," because they learned to cope with adversity as opposed to resist and attempt to transform the adverse circumstances.

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Similarly, Wright (2010) argues that the point of a sustainability appraisal is less about determining whether the glass is half full or half empty, but what we can learn from it that informs and enables moving forward along anticipated transformative pathways:

> The whole point of envisioning real utopias and thinking about the relationship between institutional designs and emancipatory ideals is to improve the chances of realizing certain values. But in the end the realization of those ideals will depend on human agency, on the creative willingness of people to participate in making a better world, learning from the inevitable mistakes, and vigorously defending the advances that are made […] In doing so we not only envision real utopias, but contribute to making utopias real. (ibid., p. 268, 270).

Sustainability Change Agents: Attributes, Practices, & Windows of Opportunities

This section reflects on the results related to research question 2: Who were the change agents and how did they (and their organizations) pursue change towards sustainability in the context of disasters; specifically how did they leverage windows of opportunities created by disasters?

Attributes of sustainability change agents. In trying to identify the SCAs, I accounted for those who pursued sustainability in a comprehensive notion and for those who pursued a select sustainability goal, such as early childhood education, or bike-friendly mobility plans. Accounting for both types of sustainability efforts was a pragmatic extension of my initial narrow focus that would have included only those SCAs who worked towards a comprehensive understanding of sustainability. This

extension was also justified as sustainability is neither part of the agenda nor repertoire of practices of the majority of organizations intervening in a disaster recovery as a seasoned disaster manager noted: "organizations are not ready for recovery, especially, they are not ready to implement sustainability projects." (RI_66)

A similarity shared across the SCAs was that they enjoyed privileged positions, albeit of different degrees, e.g., they were well educated, could draw on a supportive social and work-related network, and had some socio-economic liberties. Other commonalities referred to personal features. They were visionary and courageous, but not without self-doubts. They had to persist and insist and yet find ways to collaborate with others, including opponents. And they had to engage in self-reflection and self-care in order to persevere. A few SCAs were experienced change agents and some of them even worked as sustainability change agents pre-disaster. These SCAs were either appointed by government authorities or leadership to take on the role as a change maker during disaster recovery, or they resolved independently to accelerate their pre-disaster sustainability work. Nevertheless, the majority of the SCAs interviewed in this study, were "first-timers," people who felt catapulted by the disaster into a sustainability change agent role. Some of them had the opportunity to learn from the above-mentioned "seasoned" SCAs, but most of the "first-timers" learned on the job. Obviously, the SCAs' differential socio-economic status and their political position vis-à-vis the incumbent regime and key actors in the disaster arena defined the SCAs' individual abilities to access and instrumentalize decision-making mechanisms. As a consequence, they were differently effective in implementing and institutionalizing change across larger scales. However, a shortcoming of this research is that it failed to analyze the SCAs practices

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and to account for how differences of socio-economic status, differences in psychosocial attributes and personal experiences as change makers (in particular related to sustainability) affected practices and the effectiveness of these practices.

Juxtaposing practices of sustainability change agents' pursuits of change towards sustainability in disaster contexts in Aceh, Indonesia and Christchurch, NZ.

The SCAs working in Aceh and in Christchurch pursued similar practices, nevertheless there are some differences as illustrated in figure 13 and explained in the text below. Figure 13 is an adapted version of the figure presented in chapter 2 on the Aceh case study.
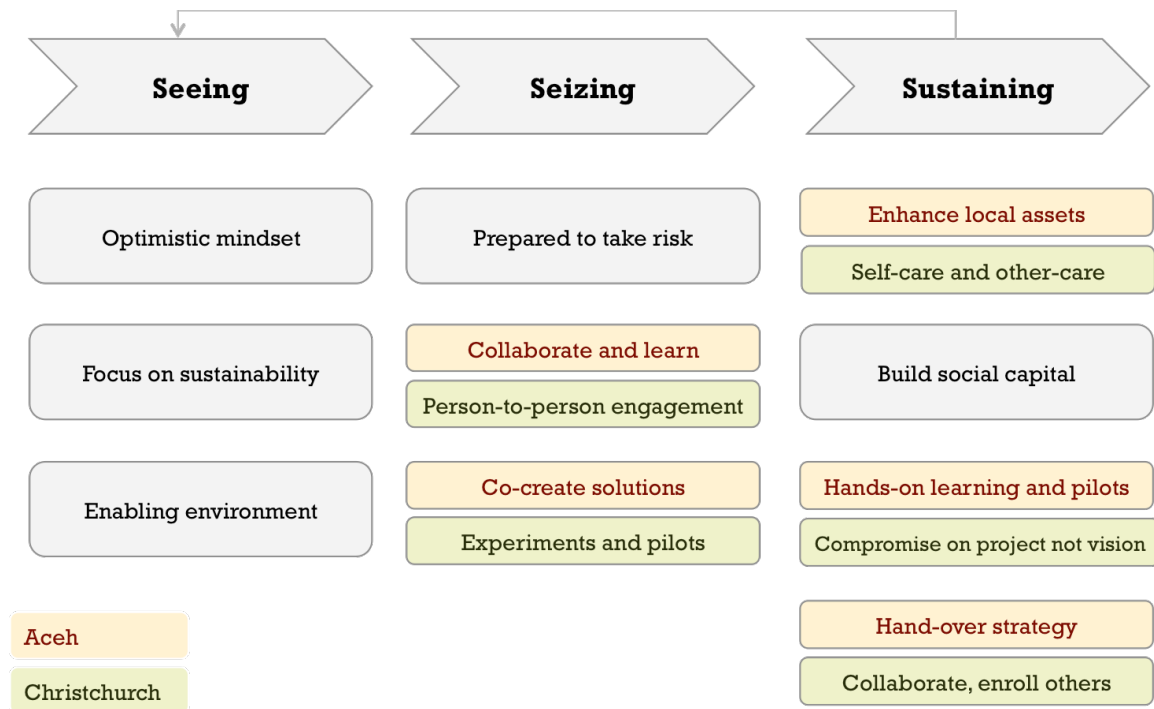

Figure 13. Main characteristics and practices across sustainability change agents in Aceh, Indonesia and Christchurch, NZ

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Figure 13 structures the attributes characterizing Sustainability Change Agents into three phases supporting the proposal made by Westley et al., (2013). The green boxes and font colors indicate practices reported from respondents in Christchurch; the red yellow boxes and red font colors indicate practices reported from respondents in Aceh, Indonesia. The grey boxes represent practices were respondents of both case studies overlap. These practices were influenced by the wider institutional context at each site as well as by the different socio-economic status of the individual SCAs.

Practices related to seeing opportunities. The ability to see opportunities for change towards sustainability in disaster contexts was essential and it was accelerated when SCAs had a deliberate focus on sustainability or on select aspects thereof; even more so, when the SCAs had worked on these sustainability issues prior to the disaster. Nevertheless, sustainability experience alone, without being sensitive to the specific disaster circumstances and able to respond to these, can be an impediment for seeing opportunities to leverage sustainability in disaster contexts (Berke, 1995). As many of the SCAs were first-timers and they were rather few and far between compared to the large numbers of actors engaging in the disaster arena and mainstream disaster recovery, the role of an enabling social and work environment becomes clear. Respondents in the Christchurch case study highlighted in particular how peer-support in the early days helped them overcome self-doubt.

Practices related to seizing opportunities. Respondents in both case studies emphasized the need to be prepared to seize the window of opportunity, which is also consistent with findings in the literature. Respondents in Aceh emphasized how the competitive and combative situation in the disaster arena, required them to "steel

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themselves" as everyone wanted to get the benefits of potential opportunities (RI_63). In Christchurch, many respondents emphasized how they had to make themselves take a leap of faith and not overthink what they were doing—they had to "just do it!"; otherwise the opportunity might be gone (CC_38, CC_41). The differences of practices in Aceh and Christchurch are more pronounced related to the remaining two attributes.

In Aceh respondents emphasized their eagerness to collaborate and learn with others in the disaster arena and beyond in order to create synergies e.g., among humanitarian and environmental efforts and in order to seize opportunities for learning about a range of practices. Seizing opportunities to learn about good practices might be motivated because the province was closed off from the world during civil war. Many respondents explained how they endeavored to co-create livelihood solution options by integrating local wisdom with professional expertise (from national and international practitioners) and scientific evidence. This practice indicates a shift away from the "vulnerability view" of disaster-affected people that tends to see them as helpless victims (McSweeney & Coomes, 2011). It also indicates that models for development collaborations aiming to advance sustainability in disaster contexts, which were proposed years ago, seem now to be part of contemporary practice of some SCAs. These models stress the importance of "mutually reinforcing relationships" between needs and capacities of local populations, the program offered through the (external) organization, and the organizational capacity between them (Berke, 1995). For instance, the efforts of some SCAs in Aceh to repurpose earmarked money, which was slated for response to become available for long-term recovery, reflect one of the five principles of the Agenda for Humanity issued by the World Humanitarian Summit (WHS), 2016. It is the principle

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to invest in humanity by promoting and increasing multi-year, un-earmarked and flexible humanitarian funding (WHS, 2016).

In Christchurch, respondents indicated that they needed to build a strong and broad team willing to support the proposed sustainability initiative, which required a person-to-person engagement. One respondent, working to construct sustainable commercial buildings, also realized that they had to win the commitment of at least two stakeholders from the entire construction supply chain, as one voice alone is quickly silenced. In contrast, his experience showed that two stakeholders could steer decision-making along the supply chain in support of sustainable choices (CC_10).

Recruiting allies through one-on-one engagements was necessarily slow, but built a deep energy compared to other outreach forms that failed to produce similar commitments. Respondents in Christchurch also said that they seized opportunities through experimentation, either as freewheeling tinkering with alternatives or as planned and structured testing of sustainability proposals aiming to deliver proof of concept.

What might explain these differences? Respondents in Christchurch made reference to the "Kiwi culture" as being a "do-it-yourself" culture that has always had good collaboration. As some sort of collaboration existed, the challenge might have been to transform collaboration into commitments to work towards the same goal. Similarly, a variety of solution options had been prepared pre-disaster and existed in forms of policy proposals (Christchurch city council), green building standards (New Zealand Green Building Council), or innovative ideas that were publicly shared through civil society groups. So, it seemed to have been more a matter of pulling these pre-existing plans out and delivering on them and less about conceiving them in the heat of the moment as in

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Aceh. This might also explain, why experiments appeared earlier in the process in Christchurch (already during the seizing the opportunity phase) compared to Aceh, where experiments and pilots were used in the "sustaining" phase as a vehicle to secure long-term support of the proposed practice. For instance, on respondent in Aceh, working in a leadership position for the city's planning department explained how they used pilot projects to inform the developments of institutions: "We started with a small area first. It is not common here: waste water treatment or offsite sanitation. So, we tried to learn a lot about the regulation and how to run the system, and what are the problems and how the community can give" (RI_48). More broadly, experiments have been recommended as an important mechanism to help identify sustainable pathways, in particular in contexts with high livelihood vulnerability (Tschakert & Dietrich, 2010). Similarly, Smith and Wenger (2007, p. 257) recommend creating "local sustainable recovery incubators in selected communities" in order to leverage sustainability during disaster recovery.

Practices related to sustaining introduced changes over time. As for sustaining, there is clearly an overlap between Aceh and Christchurch with respect to one practice, which is widely researched in disaster recovery studies—building social capital, including bonding, bridging and linking capital (Vallance, 2011). Applied to this research, building "bridging capital" refers to supporting connections and relationships among peers or organizations with similar goals. Building "linking capital" refers to supporting the development of relationships between local residents and/or organizations and higher level entities, including government bodies, markets, and international associations. Linking capital facilitates access for community groups to institutions and resources. Consoer & Milman (2016) reveal how governmental actors from within the

US state and federal disaster framework coordinated with informal community efforts in order to provide access to resources to all groups; not only those groups who had strong bonding and bridging capital and were able to access government resources themselves. While important, building bridging and linking capital is not always happening, because, as Vallance's research on the Christchurch recovery process (2011, p. 24) found, "we cannot assume the state is willing or able to effectively engage a public who is also willing and able to participate." Against this background, the work of the SCAs in Christchurch and Aceh in supporting both the bridging and linking capital can be better appreciated, in particular because they endeavored to link sustainability initiatives to disaster-affected people as well as to policies, processes, and funding programs that are unrelated to the disaster so that they are institutionally supported beyond the formally defined disaster recovery programs.

The respondents in Aceh made clear that a foundation of their intervention was that it "enhance available capacities and use existing resources." As some solution options were developed in Aceh (e.g., soy-based nutrition for children, with soy being grown and processed by women, instead of imported milk powder) or transferred to Aceh (e.g., municipal recycling programs) the use of pilot projects helped to test these things out before they were scaled up. The pilot projects also allowed for hands-on learning, which served more functions than learning as the experiential part was a powerful tool for resolving potential conflict among seemingly competing livelihood approaches and for building trust, as trust in words and documents has been eroded over many years of conflict.

An outstanding practice employed by some SCAs in Aceh was that they planned hand-over strategies early and executed them adaptively. A hand-over strategy refers to transferring the assets, infrastructures, and responsibilities created through the intervention into the hands and books of local government and facilitating coordination with the Indonesian government were necessary. Preparing the hand-over strategy early meant to involve officials and practitioners early in the effort in order to build understanding for and ownership of the effort. Comparing these practices of SCAs in Aceh with the core responsibilities of the Agenda for Humanity indicates that some of the agenda's core responsibilities are reflected in the SCAs practices, which lends some validity to these practices among some of the SCAs in Aceh. Conversely, the practices of some SCAs who worked in Aceh can serve as empirical indications of one way how to achieve the core responsibilities of the Agenda for Humanity. Through their sustainability initiatives they have put in place some foundations that may help sustain sustainability efforts over the longer term. For instance, the SCAs' willingness to learn with local communities and other stakeholder groups reflects the ability to "work differently to end need," which is one of the Agenda for Humanity's five responsibilities. Moreover, organizing a hand-over strategy early reflects ideas behind the Agenda's principle of "empower national and local humanitarian action by increasing the share of financing available to them." Nevertheless, despite the potential to serve as one approach how to implement the Agenda's core responsibilities, the SCAs' practices in Aceh were not a panacea and they often did not result in lasting and transformative change (Thorburn & Rochelle, 2014) because other concurring processes overruled these seeds of change. For instance, the political leadership was unable to support and stimulate local economic

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development undoing the achievements of the SCAs efforts to build capacity for micro-entrepreneurs and to advocate for institutional changes that facilitated micro-entrepreneurs' access to finance.

Respondents in Christchurch made clear that sustaining sustainability initiatives over time required sustaining the people driving the initiative in the first place. Hence the Aceh practice of "enhancing available capacities and using existing resources" translates in Christchurch into fostering self-care and other care. Those SCAs in Christchurch who were able to sustain themselves and their sustainability initiatives over the past five years were seen as those who had made "some wins," and these wins will make it more likely to continue than to give up. An advisor to diverse bottom-up sustainability initiatives in Christchurch observed

> the long-term wins will be by those who can win the endurance race, the
> marathons. The ones who can hold out while everyone else gets weeded away.
> This is kind of where Christchurch is now. We see some people stay and lots of
> people go and some ideas have become embedded in the [plans] and in concrete
> and steel and other ideas have not. (CC_55)

Nevertheless, challenge now for those SCAs in Christchurch who have seen wins is to strike a balance between putting the head down to advance the project and keeping an eye on the vision. Additionally, the SCAs observed that they have to find ways to strengthen the sustainability initiatives in total by merging their individual initiatives into a movement that is bigger than its parts and by keeping people enrolled. Especially, as the uncertainty about the final decisions about some sustainability-related decisions wears people out; after all, the Minister of the earthquake recovery can still take some decisions

unilaterally. This last set of activities in Christchurch resembles the Aceh practice of planning a hand-over strategy, because it means to find ways to transfer responsibility and ownership into governance institutions.

In addition to these general practices for leveraging change in disaster context, the research revealed that SCAs in Aceh and Christchurch employed specific practices related to identifying and leveraging windows of opportunities created by the disaster.

Practices to identify and leverage opportunities created by disaster. Considering the adverse circumstances, such as those in Christchurch, with a central government intervening in and supplanting local governance (Hayward & Cretney, 2014) and those in Aceh, with a post-conflict and post-tsunami society trying to heal and evolve into a democracy (Shah & Lopes Cardozo, 2014), it is easy for stakeholders to fall into the trap of binary perceptions of reality. Pertinent binaries for this study include dominant views that opportunities were missed (not seized); sustainability was lost (not achieved); and top-down processes worked against (not in support of) bottom-up processes. Some SCAs in Aceh and Christchurch were able to unpack these binary concepts and identify and leverage different types of opportunities for change towards sustainability, thus enabling them to work towards different degrees of sustainability outcomes and engage with other actors.

A typology of opportunities and outcomes. This tool supports the idea that there are different types of opportunities that can be seized in addition to the big window of opportunity, which opens post-disaster and is often hard to seize especially for organizations and start formulating their sustainability initiatives post-disaster.

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Christoplos (2006) found that organizations working on human rights and sustainability agendas need some time to find "the window latch," and the opportunities might be more apparent to them in the disaster recovery phase as opposed to during the immediate relief phase. My research revealed considerable complexity in opportunities, and that some SCAs are aware of this complexity and found ways to use it to their advantage. The tool entails two parts: a) there are different types of opportunities to effect change, including incremental and more transformational change and b) seizing opportunities leads to different types of sustainability outcomes.

Different types of opportunities to effect change. As reported in Chapter 3, some respondents in Christchurch identified different types of opportunities, which they attempted to realize. This typology is captured in the following quote of one respondent, which also illustrates that each opportunity type offers more or less potential to effect deep and lasting (transformational) change towards sustainability as compared to incremental change:

> I talk about five different aspects. They are not meant to be exclusive and they are not in a hierarchy. […] To not let things get worse. […] To repair and fix things up. […] The do-nothing opportunity. […] The "take-advantage-of…" opportunity. […] The "increasing resilience" opportunity, the latter two are closely linked. (CC_34)

In a simplified version, the types of opportunities include opportunities for incremental changes (to contain damage and to fix damage) as well as opportunities for more transformational changes (to reform what is there and to introduce something new).

In Aceh, my interpretation of interviewees' responses was that major opportunities were seized post-impact by high-level decision-makers. These include (i) linking the tsunami disaster response with the need for a peace agreement (Renner & Chafe, 2007; Fan, 2013), (ii) pushing through the stalled reform of the disaster management law to paradigmatically shift its focus from response to disaster risk reduction (Djalante et al., 2013), and (iii) appointing Dr. Kuntoro Mangkusubroto with setting up and managing the Indonesian agency for disaster recovery of Aceh and Nias. These changes opened pathways for other, in particular emerging, SCAs to subsequently pursue their sustainability efforts in Aceh and elsewhere. The latter occurred in the event that their approach was not successful in Aceh (for a variety of reasons), but entailed potential to be improved and thus realized in other disaster recovery situations. The Aceh experience reflects Christchurch's typology of opportunities. It reiterates the need to continue seeing and seizing opportunities and adds a spatial dimension as it highlights how some efforts that failed in Aceh resulted in positive sustainability outcomes elsewhere and later, because organizations committed to adaptive learning over time.

Seizing opportunities leads to different types of outcomes. In addition to identifying different types of opportunities opening post-disaster, the findings also indicate that seizing these opportunities is not necessarily a one-time action resulting in success or failure. Rather, seizing opportunities is a long, hard process with ups and downs that can yield differently successful outcomes; ranging from sustainability that is implemented on the ground and in institutions, to sustainability efforts that failed to translate into institutions or infrastructures but continue to be pursued, to sustainability efforts that exist merely as a vision, and eventually to those, where sustainability efforts

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were foreclosed or given up. Considering this range of outcomes, the function of this tool is to not become discouraged and give up too early; but to treat the "struggle to move on the pathway of social empowerment" as an "experimental process" (Wright, 2010). This function of holding hope was echoed by participants at public meetings in 2015 and 2016, where I shared my research. In Christchurch, respondents remarked that windows of opportunity to advance sustainability open and close, as long as there is a set of sustainability principles, which allows moving forward on either one independently depending on the opportunities; this means hope is not lost. In Jakarta, one respondent highlighted that a missed opportunity only becomes a missed opportunity, once others failed to retrofit the damage done by the 'missed opportunity'. He appealed to other participants arguing "we need to be aware of opportunities missed. Instead of mourning them, we should know that it is not too late. There is still something that can be done about it. Instead of just drawing lessons learned about the missed opportunity, we have an opportunity to apply these lessons learned to this missed opportunity!" (AFDR_2015)

The tool of typology of different opportunities and outcomes helps reveal that deliberate and bottom-up post-disaster change processes towards sustainability are related to concurrent processes, such as the disaster recovery processes led by the government and other agencies as well as developments unrelated to the disaster, such as economic restructuring, global initiatives, or local trends (Tierney, 2012). Eakin & Wehbe (2008) highlight the close coupling between individual efforts and systemic response, showing how individual efforts in their aggregate form undermine sustainability on higher scale and how improved governance arrangements could prevent such disconnects. Similarly, awareness of these concurrent processes on larger scales can offer sustainability

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initiatives a springboard to accelerate their efforts or they can derail the sustainability

efforts. Addressing this shortcoming, future research should investigate how specific

capacities of SCAs – i.e., capacities specifically oriented towards leveraging

opportunities for change towards sustainability in disaster contexts – are enabled or

hampered by the level of generic capacities – i.e., attributes of individuals and

populations associated with general human development (education, access to human

services, economic stability, institutional reliability and strength) (c.f., Eakin et al.,

2014).

Juxtaposing Case Study Findings And The Theoretical Framework

Relating the findings from the case studies back to the theoretical framework,

allows drawing some insights about pivotal factors for success or failure of efforts to

leverage opportunities for change towards sustainability in disaster contexts (c.f.,

research question 3). Reflecting on the findings to research question 3, this section offers

ideas how to strengthen SCAs and their sustainability change efforts in a disaster context

and reflects on some the contextual features hindering change towards sustainability.

Ways to increase effectiveness of sustainability change agents in disaster

contexts. Sustainability Change Agents emerged in a post-disaster context, either as

"seasoned" change makers or as "first-timers." However, few were able to endure over

time. One approach to strengthen sustainability initiatives and their leaders would be for

the SCAs to find ways of linking their initiatives so that they work synergistically and

create umbrella projects (Westley et al., 2013), as well as connecting with leaders of

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initiatives to form a collective network such as a disaster transition arenas (Loorbach, 2010) or shadow networks (Olsson et al., 2006). Respondents in Aceh and Christchurch both recognized the need for more and better coordination and collective action and some initial actions were taken. The Aceh Civil Society Task Force has attempted to establish itself as an umbrella organization for other civil society organizations aiming to advance peace and sustainability. In Christchurch, various Third Sector Organizations decided to increase their coordination to "co-create a green pathway." The SCAs efforts to build networks and establish a disaster transition arena can be supported, e.g., by municipalities or disaster recovery authorities helping to build structures that facilitate connections between disaster recovery and sustainable development efforts. These structures can include funding and appointing a "sustainability liaison," a person or entity that helps connect all things sustainability in the midst of the complexities of the disaster arena. "Liaising" was highlighted in both case studies as well as in other comparable case studies as a pivotal practice (c.f., Chapter 1 and 3). Indeed, one political leader in Christchurch asserts: "never say no to funding such a position" (CC_50). Another example is the approach taken by the Ministry of Social Development in New Zealand, which combined the allocation of funds to local social service providers in Christchurch's disaster recovery with the expectation that these providers work with each other to work towards a collective impact for the geographic area they serve. These empirical findings about disaster transition arenas, sustainability liaisons, and collective impact approaches and are endorsed by through the literature (e.g., Kaina & Kramer, 2011; Williams, 2002). Specifically, Smith & Wenger (2007, p. 247) remind authorities and organizations of proposals made already in 1998 intended to leverage sustainability during disaster

recovery. One of these proposals entails allocating 1% of disaster funding to support sustainability efforts and to create and deploy sustainable redevelopment "strike teams" and sustainability experts to "Disaster Recovery Centers," operating in the field. This reflects the idea of a "sustainability liaison." The other pertinent proposal, reflecting ideas about disaster transition arenas and shadow networks, is about creating "collaborative planning networks … comprised of professionals … nonprofits, community and environmental groups, and businesses that have successfully implemented sustainable recovery programs and are willing to share their experiences with others." (ibid., 257) Together these efforts contribute to making sustainability efforts visible. As some changes take a long time until they become public and manifest in daily life, lack of visibility of work in progress has been interpreted in public discourses in both case studies as a sign that nothing is happening, adding to the frustration and hopelessness experienced by parts of the population.

Contextual features hindering sustainability initiatives in disaster contexts. The premise of the theoretical framework was that the various sustainability-oriented changes would be able to use the window of opportunity, which would allow accelerating their individual efforts, and collectively aggregate to a systemic shift. Yet, the results of the sustainability appraisals indicate that in both case studies the net progress towards sustainability was rather small compared to the opportunity for transformation and did not trigger systemic shifts; or maybe—not yet as some changes may need sustained action over a longer period of time in order to enfold.

For instance in Christchurch, the new city council undertook and still undertakes various and serious efforts to respond to residents calls for local governance and reinforces, reforms, and expands democratic practice; in many ways implementing good practices recommended by scholars (c.f., Hayward & Cretney, 2014). Nevertheless, city council does so within an increasingly narrower operating space of democratic practices due to institutional changes by the national government that pit democratic against neoliberal approaches (Humpage, 2011; Jones, 2016). In Aceh, the peace-agreement indicates a systemic shift; yet, respondents made clear that this shift was not strong enough to transform other contextual and deep seated features, such as the complex interplay of nepotism, clientelism, and corruption—a war-time legacy in Aceh. Nevertheless, Shah and Lopes Cardozo (2014) reviewing the transformational potential within the educational sector for society and culture in Aceh as a whole, conclude that it is not too late to "promote a more transformative peacetime recovery for the province," drawing on and promoting the diversity of organizations and actors engaged in reform efforts.

These empirical examples suggests that disasters create opportunities for systemic change in terms of creating a tipping point as proposed by Pelling & Dill, (2010)—they led to reactivation of democratic practices on the local level in Christchurch and to a peace-agreement in Indonesia. Yet, in order to achieve a systemic shift of the whole system, touching on all daily activity fields and sustainability dimensions, more change is needed, building upon and expanding the accomplishments generated through the democratic reforms and peace-agreement, respectively. This speaks to the important role of gradually expanding change as a necessary and complementary action to

transformative efforts. Furthermore, it speaks to the need to monitor and collect the

evidence that proves that these changes, gradual and transformative, are happening; even

if there are no publicly visible manifestations of them. Park et al. (2012) proposed a

similar concept to promote transformative actions necessary to address climate change.

Their concept distinguishes two different and parallel decision-making processes related

to transformative and incremental actions. The key is to identify, when and how these

two processes can intersect to catalyze incremental actions into transformative pushes.

Viewed through this lens and applied to my research, the diverse post-disaster windows

of opportunity, offer touch points between incremental and transformative actions. They

are not a panacea, but an opportunity to accelerate deliberate change, if people are able to

keep looking for and identifying opportunities for both types of actions. This is

challenging, as indicated by the empirical examples. The initial impetus for these

initiatives emerged as transformative change, resulting from deep insights (triple loop

learning), about the underlying social structures and utopian desires to change them; as

revealed by the disaster (Fritz, 1996). Yet, once these changes started to manifest, the

SCAs seemed to get confined to improving the shortcomings of the incumbent system

instead of continuing their original aspiration of transforming that very system (double

loop learning). Lastly, some changes, as indicated in the typology of opportunity, start

out or end up with only being able to fix the damage done, basically averting the status

quo from getting worse (single loop learning). [41] How can the chiseling away of the

transformative power, entailed in the original ideas, be averted and all three forms of

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[41] The concept of triple, double and single loop learning draws on the work of Argyris & Schoen (1974) and been used in various of the works, which I draw on my research.

learning kept active? While this is an area in need for further research, this research

brings up two aspects that need further investigation. Creating and nurturing participatory

developed visions are seen by disaster- and sustainability transition scholars alike as

essential for informing and supporting the long process of transformative change (Berke

& Campanella, 2006; Wright, 2010). Democracy is often assumed as a given and as

something sustainability transitions can draw on; however in disaster situations an

attrition of democratic processes has been observed in developed and developing

countries. Recognizing that potentially the community and the state are dysfunctional as

well as lacking formal mandates and "representational legitimacy," Love and Vallance

(2013) suggest combining "orthodox planning approaches" used in normal times with

other approaches used for "nascent" or "wartime democracies" in order to develop a

participatory disaster recovery process.

Contributions and Limitations of This Research

This research contributes to theories and practices relevant to disaster and

sustainability communities of scholars and practitioners. For the scholarly communities,

it provides an integrated framework, synthesizing the literatures from disaster and

sustainability research around mechanisms of change, while drawing on the positive and

strength-based approaches to disaster and sustainability research. The research also

illuminates the notion of the window of opportunity from a bottom up perspective of

local actors, offering an empirically inspired typology of opportunities and outcomes.

This typology confirms, extends, and details existing proposals (e.g., Westley et al., 2013,

Institute of Medicin, 2015). This typology is organized as a matrix, which distinguishes

different opportunities for change, including those allowing for incremental and transformative changes, and combines them with different types of sustainability outcomes. Considering the range of daily activity fields and sustainability dimensions, the typology of opportunities and outcomes provides an approach to advance progress towards sustainability along various avenues, even when the short-term, big, post-impact window of opportunity closed or was missed by the powers that be. For the community of practitioners, the framework offers a heuristic, a way of conceiving opportunities for change towards sustainability in disaster recovery processes. Moreover, the research shed light on the existence and role of sustainability change agents, and how disaster management, planning, as well as humanitarian organizations can potentially connect with sustainability change agents in order to link planning as well as disaster response and recovery with development approaches.

The limitations of the research findings originate in the research design. In order to conduct two empirical case studies, I chose to interview peer-identified leaders of sustainability change initiatives. My set of interviewees did not include the constituencies and intended beneficiaries of the aspired sustainability changes nor opponents to such changes, or other perspectives and hence failed to elicit these groups' perception of the change processes and their outcomes. Nevertheless, I adopted a representational approach, drawing on the peer-identified leaders as experts with the assumption that they represent their constituencies, because the majority of sustainability change initiatives involved in this study can be categorized as initiative-based learning transitions. These initiative-based learning transitions are organized around the motives and perceptions of the actors involved in defining and legitimizing new practices, reflecting their bounded

understanding of the situation and context around them, in order to evolve into socially

robust transitions (Turnheim et al., 2015). Moreover, engaging with the constituencies

and intended end-users would have required a substantial time and financial investment

in order to fully implement a deeply embedded ethnographic research approach,

including learning the basics of the local languages and living on site over extended

periods of time. It would also have implied to focus on one case study instead of two;

adding depth to one at the expense of having the ability to juxtapose insights and identify

pointers for generalizability. A related limitation concerns the sustainability appraisal,

which I conducted myself in qualitative ways, drawing on the appraisals provided by

interview respondents, some secondary data and other literature, if easily available.

Future work should combine this qualitative approach with quantitative ways of systems-

modeling and multi-criteria analysis and find ways to conduct the appraisal in

collaborative and inclusive ways in order to properly (i) triangulate the perspectives of

the SCAs with the perceptions of people on the ground and secondary data and (ii) to

determine the systemic relations among the sustainability criteria. Nevertheless, the

intention of the sustainability appraisal is less to provide an objective assessment than to

provide a proposal for an instrument and how the act of *applying* the sustainability can

inform change towards sustainability. Similarly, while the perspective of the

sustainability change agents drove the analysis, the focus of the research was less on the

degree and quality of change itself and more on the people who advocated for change and

on the practices they used to move their desired changes forward. While I might have

been caught up inside the discourse that the SCAs told me, it is important to acknowledge

that part of the SCAs ability to successfully promote their sustainability initiatives, was

that they needed to find ways to both be accountable to their constituencies and able to collaborate with actors pertaining to the incumbent regime. While my data indicates that the SCAs put effort in "building strong teams" and act as liaisons, the research insufficiently demonstrates the actors network involved in each change process and how the composition of this actors network evolved along the pathway of change.

The research also entails limitations related to practical implications. The perceived practical utility of the framework and its component tools as planning instruments still needs to be translated into actual tools, which then need testing.

Areas for future work. More work needs to be done in the future on the theoretical framework in order to support SCAs in protecting their visions from being shelved and in providing a set of options about what combining "orthodox planning approaches" with those used in emerging democracies means for designing participatory and sustainability-oriented disaster recovery approaches.

Other future work includes differentiating the practices of SCAs depending on their socio-economic status as well as comparing the practices found by the SCAs with the practices of sustainability change agents working in normal times in diverse contexts in terms of culture and development. This research did not entail a control case, which would have allowed to empirically investigate this question. Additionally, while chapter 4 offers a proposal for an educational approach to train sustainability students in concepts and practices for leveraging sustainability in disaster contexts, the specifics of this proposal need to be determined and empirically tested, including across diverse cultural contexts. Nevertheless, this educational proposal contributes to efforts to establish and

implement sustainability recovery training programs, which Smith & Wenger (2007) identified as important in order to operationalize a sustainability recovery agenda.

Lastly, my research also gathered recommendations how to improve disaster recovery and enhance the conditions to leverage sustainability during disasters. Analyzing this rich body of data in the future is timely, considering how its results can contribute to the work many practitioners start to embark on now, responding to the confluence of three important global developments: the agreements related to the sustainable development goals and core responsibilities for humanitarian work detailed in the Agenda for Humanity as well as the Paris climate change agreement.

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APPENDIX

APPENDIX A

SUSTAINABILITY APPRAISAL

Instrument and Overview of Respondents

Appraising the enhancement of basic sustainability principles

Natural environment and natural resources.

- Were actions taken that enhance the quality of water, soil, air, or biodiversity (e.g., creation of a natural reserve, or a watershed protection program)?

- Were remediation actions on contaminated water, soil, air, or ecosystems undertaken (e.g., cleaning up contaminated groundwater or industrial production sites [*not* only related to the disaster!])?

- Were land-use and urban development plans adopted that minimize impacts on the natural environment (e.g., favoring public transit such as busses, trains, ferries, and bicycling infrastructure over infrastructure for the automobile)?

- Were actions taken to use construction material as efficiently as possible (e.g., create programs to avoid waste, recycle and reuse construction material, source construction material locally when appropriate, ban toxic construction material)?

- Were actions taken to reduce overall energy use and support production of renewable energy (e.g., create renewable energy program)?

- Were actions taken that reduce overall water use (e.g., programs supporting water-efficient irrigation technologies (traditional, novel); use of water-efficient indoors appliances)?

Social Well-being.

- Were cultural heritage sites preserved or commemorative places built, which support communities in healing from trauma, expressing values of the collective, or offering a source of pride (e.g., rebuilding of local landmarks and heritage sites such as old buildings or places of worship; creation of a demonstration agro-forestry site exhibiting traditional agricultural practices; creation of a public place/monument exhibiting stories of pride of the community)?

- Were public facilities, infrastructures, and services actively maintained or created (e.g., health care, energy, electricity, water, sewer, waste, public information, education, worship, mobility, essential shopping, recreation) (e.g., programs for disabled people, newsletters and press releases about recovery process)?

- Was quality housing and land (including formal titling) provided and thereby socio-economic displacement or segregation avoided (e.g., using owner-driven approaches supplemented with technical and social assistance; adhering to good practices codified in guidebooks from NGO community (e.g., The Sphere Handbook) or donor community (e.g., Rekompak, Safer Homes, Stronger Communities); adhering to updated building codes, international safety energy standards)?[42]

- Was social cohesion in the community increased and previously disadvantaged groups better connected (e.g., did programs support the formation of communities

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[42] The Sphere Project; The Secretariat of the Multi Donor Fund for Aceh and Nias and the Java Reconstruction (2012); Shah et al. (2010).

in heterogeneous areas e.g., neighborhood communities, associations of the elderly; did programs support the collaborations among each other and facilitate access to officials; support can exist in offering meeting rooms, sending local officials to attend community meetings, and fund activities such as community workshops or outreach)

- Were civic engagement and self-efficacy enhanced to foster democratic participation in community governance by all groups (in particular vulnerable groups such as women, elderly, disabled and children) (e.g., did programs of international and other NGOs have clear public accountability structures; did programs incorporate or support capacity building of community members from the outset)?

Livelihoods and Public Finances.

- Was meaningful and satisfying employment created in the community offering sufficient income and livelihood opportunities (e.g., were micro credits available; were support services offered to help local businesses recover and adapt to new sustainability regulations; were new firms acquired that commit to CSR or sustainability)?
- Was the local economy (that the community is part of) strengthened (e.g., creation of agro-ecology-tourism programs, increased local production for local markets;

facilitation of locally owned business associations; development of appropriate

public-private partnerships)[43]?

- Were the public finances reorganized in a way that they work exclusively for

   public goods, are balanced, and governed in transparent, participatory, and

   accountable ways (e.g., use of social accountability tools including participatory

   budgeting processes; release of information and performance measures)?[44]

- Was development aid and post-disaster funding used for long-term recovery in

   addition to short-term emergency response (e.g., appropriate splitting of funds for

   relief and recovery (ratio); INGOs reorganized donation requirements to allow re-

   allocation of funds according to needs)?

- Was development aid and post-disaster funding used in transparent, participatory,

   and accountable ways (e.g., did donors, NGOs, private foundations, private

   contractors and other civil society organisations report their funds to IATI in a

   timely manner)?[45]

Appraising the Enhancement of Crosscutting Sustainability Principles.
Equity/Equality.

- Were the benefits and costs of the aforementioned actions distributed equitably to

   all social groups within the community (incl. disadvantaged, disenfranchised,

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[43] World Reconstruction Conference 2, September, 2014, Washington D.C.

[44] Farmer (2014); Smyth (2007); Bakkar et al. (2011); The Participatory Budgeting Project; Shah (2007); Lamarca (2012).

[45] International Aid Transparency Initiative; Aid Transparency Index (2012)

disempowered populations) (e.g., welfare programs for populations affected by disaster and violent conflict; gender- or age-sensitive programming)?

- Were the benefits and costs of the aforementioned actions equitably distributed to *present and future generations* of the community (e.g., community considered what impacts its plans and development actions could have on other communities and future generations; implementation of integrated regional development master plans)?

- Were the benefits and costs of the aforementioned actions *fair to neighboring or otherwise functionally connected communities* (e.g., the community considered or even coordinated with other communities on a larger scale to minimize identified negative impacts)?

Adaptability.

- Were the aforementioned actions based on anticipation *looking 25 years ahead* and account for different possible future developments (e.g., consideration of climate change scenarios; visioning activities)?

- Did the aforementioned actions incorporate *disaster mitigation and risk reduction and sustainable development* in order to enhance disaster resilience (e.g., mangrove reforestation programs, implementation of reformed building codes)?

- Were the aforementioned actions guided by *clear long-term sustainability goals* (e.g., eliminate poverty, support viability of microenterprises, reduce pollution), yet allowed for flexibility in the implementation stage (e.g., Poverty reduction programs, greenhouse gas mitigation Plans)?

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Table 1

Sustainability Appraisal Matrix Emphasizing The Role Of Equity/Equality And

Adaptability As Cross-Cutting, Not Separate Principles.

Enhancing Basic Sustainability Principles?		Enhancing Crosscutting Sustainability Principles	
		Equity / Equality	Adapt-ability
Natural Environment & Natural Resources			
1. Were actions taken enhancing the quality of water, soil, air, or biodiversity?			
2. Were remediation actions on contaminated water, soil, air, or ecosystems undertaken (not only related to the disaster)?			
3. Were land-use and urban development plans adopted that minimize impacts on the natural environment?			
4. Were actions taken to use construction material as efficiently as possible?			
5. Were actions taken to reduce future overall			

energy use and to support renewable energy?			
6. Were actions taken that reduce future overall water use?			
Social Well-being			
7. Were cultural heritage sites preserved or commemorative places built, which support communities in healing from trauma, expressing values of the collective, or a source of pride?			
8. Was quality housing and land (including formal titling) provided and thereby socio-economic displacement or segregation avoided?			
9. Was social cohesion in communities increased and disadvantaged groups better connected?			
10. Were civic engagement and self-efficacy enhanced to foster democratic participation in community governance by all groups?			
11. Were public facilities, infrastructures, and services actively maintained or created for all daily activity fields?			
Livelihoods & Public Finances			
12. Was meaningful and satisfying employment			

created in the community offering sufficient income and livelihood opportunities?			
13. Was the local economy (that the community is part of) strengthened?			
14. Were public finances reorganized in a way that they work exclusively for public goods, are balanced, and governed in transparent, participatory, and accountable ways?			
15. Was post-disaster funding used for long-term recovery in addition to emergency response?			
16. Was post-disaster funding used in transparent, participatory, and accountable ways?			

Equity: Were benefits and costs of above actions equitably distributed considering:
1. all social groups, incl. disadvantaged and disenfranchised populations?
2. present and future generations of the community?
3. neighboring or otherwise functionally connected communities?

Adaptability: Were aforementioned actions…
1. based on anticipation (looking 25 years), accounting for different possible future developments?
2. enhancing resilience by incorporating disaster mitigation, risk reduction and sustainability?
3. guided by clear long-term sustainability goals?

Table 2

Overview of interview respondents: affiliations, positions, daily activity field focus

ID	Stakeholder type	Position	Primary daily activity field focus
1	Local Third Sector Organization	Chair	Engaging
2	National Government, retired	Senior leadership level executive manager	Adaptability
3	District Government Actor	Program manager	Caring
4	Local Third Sector Organization	Chair	Eating
5	Private Sector	CEO	Housing
6	Research	Graduate Student	Engaging
7	Local Third Sector Organization	Program Manager	Engaging
8	Local Government Actor	Engagement Advisor	Educating
9	Research; NGov	Program Manager	Engaging
10	Local Government Actor	Program Manager	Housing
11	Local Third Sector Organization	CEO	Communicating
12	Research; Private Sector	Professor; Principal	Housing / Working
13	Research	Professor	Being mobile
14	Research	Professor	Adaptability
15	National Government, CERA	Senior leadership level executive manager	Engaging
16	Private Sector	Senior leadership level executive manager	Caring (insurances)
17	Research	Graduate student	Worshipping
18	National Government, EECA	Program Manager	Being mobile, housing
19	Research	Graduate Student	Engaging
20	District Government Actor	Senior leadership level executive manager	Caring
21	District Government Actor	Senior leadership level executive manager	Caring
22	Private Sector	CEO	Communicating
23	Research	Professor	Working
24	Stronger Ch. Infrastructure Rebuild Team	Program Manager	Being mobile, housing
25	Local Third Sector Organization	Active member	Eating
26	National Government, CERA	Program Manager	Housing
27	Research	Graduate Student	Engaging, Educating
28	Private Sector	Program Manager	Working
29	Research	Research Fellow / Lecturer	Housing
30	Local Third Sector Organization	Chair	Educating
31	Private Sector	Attorney	Caring (Insurances)
32	Private Sector	CEO	Adaptability
33	Local Government Actor	Council member	Engaging
34	District Government Actor	Senior leadership level executive manager	Caring (environment), various
35	Private Sector	CEO	Engaging
36	Social Enterprise	CEO	Housing
37	Private Sector	CEO	Working
38	Local Third Sector Organization	Active member	Engaging
39	Research	Research Fellow / Lecturer	Housing / Working
40	Local Third Sector Organization	DIrector	Engaging
41	Local Third Sector Organization	Director	Caring (insurances)
42	Local Third Sector Organization	Director	Caring (environment), recreating
43	Private Sector	Director	Engaging
44	Private Sector	Director	Engaging (Finance)
45	National Government, CERA	Senior leadership level executive manager	Engaging
46	Local Third Sector Organization	Program Manager	Caring
47	Local Third Sector Organization	Board Member	Engaging
48	Local Third Sector Organization	Director	Engaging (Youth)
49	District Government Actor	Senior leadership level executive manager	Engaging
50	Local Government Actor	Senior leadership level executive manager	Engaging
51	Local Third Sector Organization	Program Manager	Caring (Youth)
52	District Third Sector Organization	Program Manager	Engaging (Finance)
53	Research	Associate Professor	Educating
54	Local Third Sector Organization	Director	Caring (Women), Engaging
55	Research	Research Fellow / Lecturer	Educating
56	Local Government Actor	Senior leadership level executive manager	Caring
57	Local Third Sector Organization	Program Manager	Eating
58	Local Government Actor	Senior leadership level executive manager	Engaging
59	National Government, CERA	Senior leadership level executive manager	Educating (CERA)
60	National Government Actor	Program Manager	Adaptability
61	Local Third Sector Organization	Board Member	Housing

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APPENDIX B

ASU IRB LETTER

Hallie Eakin
Sustainability, School of
480/727-7764
Hallie.Eakin@asu.edu

Dear Hallie Eakin:

On 7/17/2014 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Disaster as Opportunity for Sustainable Development
Investigator:	Hallie Eakin
IRB ID:	STUDY00001288
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• HRP-502c-ConsentDocumentFormShort_FocusGroup_Brundiers_V2.pdf, Category: Consent Form; • HRP-502c-ConsentDocumentFormShort_Interviews_Brundiers_V3.pdf, Category: Consent Form; • HRP-502c-ConsentDocumentFormShort_OnlineSurvey_Brundiers_V3.pdf, Category: Consent Form; • HRP-503a_Protocol_Brundiers_V4.docx, Category: IRB Protocol; • Protocol_Interview_Questionnaire_V4.docx, Category: IRB Protocol; • Overview_Methods_Brundiers.docx, Category: IRB Protocol; • ContactLetter_NGOs.pdf, Category: Recruitment Materials; • Information_Sheet_Brundiers.pdf, Category: Recruitment Materials; • OnlineSurveyRecruitment Script_Brundiers.pdf,

	Category: Recruitment Materials; • SnowballSampleRequest Script_Brundiers copy.pdf, Category: Recruitment Materials;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 7/17/2014.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Katja Brundiers
        Katja Brundiers

APPENDIX C

PUBLICATIONS AND PERMISSIONS

An earlier and abbreviated version of chapter 2 "Seizing Opportunities For Change

Towards Sustainability During Disaster Recovery: The Case Of Aceh, Indonesia" will be

published as a chapter with the title "Post Disaster Recovery as Resilience Building" in

the book "Disaster Risk Reduction in Indonesia: Environmental, Social & Cultural

Aspects" edited by Dr. Douglas Paton and Dr. Saut Sagala; publisher and editor: Charles

C. Thomas, Springfield, Illinois.

An earlier and abbreviated version of chapter 4 "Leveraging Disasters For Accelerating

Change Towards Sustain-Ability: Education And Capacity Building" as been presented

as a paper at the 8th Widyatama International Seminar on Sustainability (WISS) biannual

conference in Sustainability Systems held by Universitas Widyatama, Bandung,

Indonesia.

Permission to include the figure 9 on page 137 was granted by the Institute for

Congregational Trauma and Growth (email correspondence from November 28, 2016).