Lessons Learned from the 2013 Calgary Flood:

How to prepare for the next disaster

by

Consuelo Rivera-Letelier

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Name:	**Consuelo Rivera-Letelier**
Degree:	**Master of Urban Studies**
Title:	**Lessons Learned from the 2013 Calgary Flood: How to prepare for the next disaster**
Examining Committee:	**Chair: Karen Ferguson** Professor, Urban Studies Program and Department of History **Meg Holden** Senior Supervisor Professor, Urban Studies Program and Department of Geography **Anthony Perl** Supervisor Professor, Urban Studies Program and Department of Political Science **Katie McPherson** External Examiner Chief Resilience Officer, City of Vancouver
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Abstract

Urban centres are constantly exposed to natural hazards. Recovering from natural disasters is a complex process that lacks a grounded theory and an operational definition. This thesis proposed a two-layer conceptual framework that can be helpful when exploring the implementation of recovery efforts. This research project explores the municipal approach of the City of Calgary during the recovery from the 2013 Southern Alberta Flood. The City of Calgary responded to this flood in a partially effective manner. The Calgary case study is a case where the local government had in place the right processes to develop an effective recovery. Nevertheless, the City requires guidance on what a recovery plan should address. Calgary's approach proposes challenges related to the development of meaningful public participation methods and the slight assistance provided to the business community. Recovery is an action that requires the involvement of the affected and relevant stakeholders to help build governance capacity, which in turn creates a resilient community.

Keywords: natural disaster recovery, effective recovery, disaster resilience, socio-ecological resilience, institutional response, governance capacity.

Dedication

Mi perri, tu nombre debería estar en la portada de esta tesis también. Nada, absolutamente nada sobre este "sueño" canadiense podría haber sido posible sin tu apoyo incondicional, tu paciencia y tu amor. Espero que sigamos cumpliendo sueños juntos.

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Abbreviations

ACRP	Alberta Community Resilience Program
ALT	Administrative Leadership Team
BPBC4	Business Plan and Budget Cycle 4 2015-2018
CBRTF	Calgary Business Recovery Task Force
CCC	Calgary Chamber of Commerce
CEMA	Calgary Emergency Management Agency
CEMM	Calgary Emergency Management Model
DRP	Disaster Recovery Program
EOC	Emergency Operations Centre
FRTF	Flood Recovery Task Force
FSR	Fiscal Stability Reserve
HSCA	Hillhurst Sunnyside Community Association
KRA	Key Result Area
MEP	Municipal Emergency Plan
MIRP	Municipal Infrastructure Recovery Program
NDRC	Natural Disaster Response Cycle
ROC	Recovery Operations Centre

Chapter 1. Introduction

The purpose of this thesis project was to research the process of natural disaster recovery in the context of a flood, which is Canada's most common natural disaster. The Lower Mainland in British Columbia has not faced a flood for over 70 years. Therefore, in order to inform the City of Burnaby in terms of natural disaster recovery, this research project studied a recent flood. Calgary faced a catastrophic flood on June 20th, 2013. In this thesis project, I examine the recovery framework that the City of Calgary created to help its residents and infrastructure recover from this disaster. In addition, I explore recovery efforts implemented in Hillhurst Sunnyside, an inner-city neighbourhood. The following questions guided data collection and analysis for this research project: How should the effectiveness of the City of Calgary recovery plan from the 2013 flood be assessed? What lessons can be drawn from the implementation of the 2013 recovery plan in the Hillhurst Sunnyside neighbourhood? And, what lessons learned can be applied in the City of Burnaby regarding natural disaster recovery?

The first part of the paper focuses on establishing a normative stance from an institutional perspective on effective recovery planning and what steps should be taken by a local government to achieve success. The second part focuses on understanding the municipal response to this event. This examination involved the analysis of qualitative data such as official documentation, media reports, interviews and site visits. The analysis was pursued through the creation of a two-layer conceptual framework that poses recovery outcomes and processes. The final section is a discussion about Calgary's response to the 2013 flood. This discussion helps to determine the effectiveness of the implemented framework.

Part of the Appendices (Appendix A) provides recommendations based on the Calgary experience for the City of Burnaby. These suggestions are grounded in the context of Burnaby and lessons learned about the City of Calgary's recovery approach.

1.1. Natural Disaster Recovery

Cities are constantly exposed to natural hazards (Inam, 2005; Schwab, 1998). The impact of a natural hazard only becomes a natural disaster when urban development occurs in unsafe areas, and widespread destruction and failure of urban systems results (Comerio, 1998; Inam, 2005; Godschalk, 2003; McEntire, 2007; Olshansky & Chang, 2009; Schawb, 1998). For instance, if a flood impacts an unpopulated area it will provide ample research data regarding ecological balance and evolution but "it will not be considered a disaster" (Comerio, 1998, p. 4).

Unfortunately, there is no theory to guide research and practice when it comes to natural disaster response (Olshansky, Hopkins, and Johnson, 2012; Olshansky & Chang, 2009; Smith & Wenger, 2006). Research performed by Haas, Kates, and Bowden in the late 1970's was the first approach to understand the dynamics of post-disaster response (Olshansky & Chang, 2009; Rubin, 2009; Schwab, 1998). They developed a model, known as the "wave chart" (Rubin, 2009; Rubin, Saperstein, and Barbee, 1985), that identified four phases – (1) emergency, (2) restoration, (3) replacement, and (4) commemorative, betterment and developmental construction (Olshansky & Chang, 2009; Rubin, 2009; Schwab, 1998). However, through the years, academics that worked with this model found that it did not always reflect the experiences of affected communities (Rubin, 2009; Rubin *et al.*, 1985; Schwab, 1998). More than a decade later, Rubin *et al.* (1985) in a multi-case study observed "that many of these periods overlapped to a greater extent than the theory suggested" (Schwab,

1998, p. 8). This means that the wave chart was an oversimplification of the post-disaster response, where the stages were not sequential, and they varied in length and intensity depending on different circumstances (Rubin, 2009; Schwab, 1998).

Even though the academic community agrees with the “wave chart”, each phase has been attributed different labels by different researchers (Schwab, 1998). Naming each phase is not the only issue, definitions of each stage also fluctuate (*Ibid*). This fluctuation could be attributed to the lack of clear limits between each period (*Ibid*). These issues pose a challenge when trying to build a theory to guide natural disaster research and practice (*Ibid*). In order to provide a conceptual base for this project, I have labelled and defined each period with terms that I found were used consistently by different scholars and according to the actions considered in each phase. To begin with, I have named the “wave chart” the Natural Disaster Response Cycle (NDRC) (Figure 1).

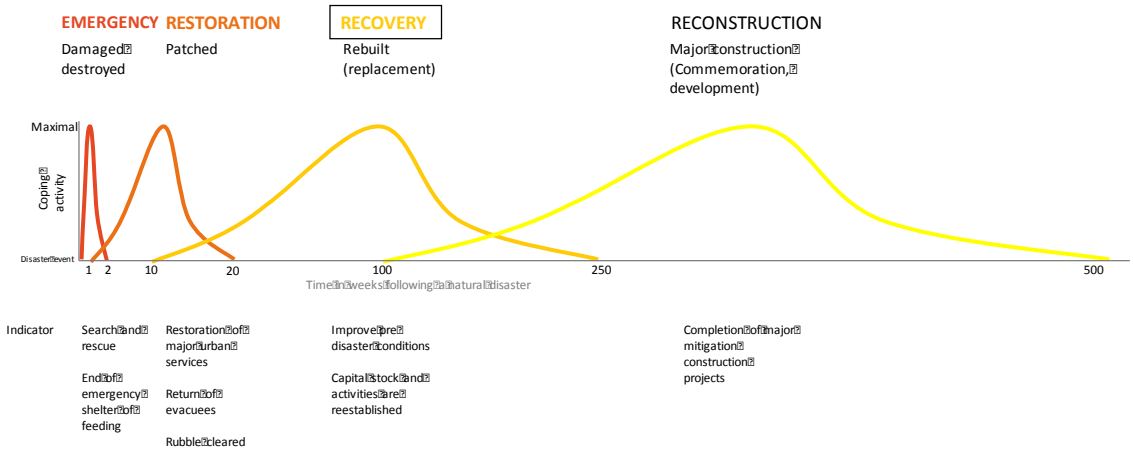

Figure 1: Natural Disaster Response Cycle (NDRC)
Source: Adapted from Rubin (2009). Long Term Recovery from Disasters – The Neglected Component of Emergency Management.

(1) The emergency phase takes place in the first hours or days after the disaster when normal activities are disrupted (Comerio, 1998; Schwab, 1998; Wachs & Kamel, 1996). The purpose of this phase is to save lives and minimize damage (Olshansky &

Chang, 2009). These actions consist of rescuing victims, providing temporary shelter, and clearing damaged structures (Inam, 2005; Olshansky & Chang, 2009; Wachs & Kamel, 1996).

(2) Following the emergency phase comes the period of restoration, which could last months. This stage considers the reparation of infrastructure, like the restoration of power and lifeline services, removal of debris, and provision of temporary housing (Comerio, 1998; Olshansky & Chang, 2009; Schwab, 1998; Wachs & Kamel, 1996).

(3) Recovery, also labelled as redevelopment, rehabilitation and long-term recovery, is a phase that contemplates short and long-term development actions that aim to provide a sense of stability and replacement of infrastructures (Inam, 2005; Olshansky & Chang, 2009; Schwab, 1998). Some definitions center on the reparation of the built environment; and others defined recovery as a social process shaped by pre- and post-disaster planning conditions that reshape the physical, social, economic, and natural environment (Smith & Wenger, 2006). This definition of recovery focuses on the processes involved rather than the final outcome of this phase (Schwab, 1998; Smith & Wenger, 2006). This approach is useful to assess recovery because since there are no clear limits of when recovery begins and ends, it is hard to know when to measure the accomplishment of recovery (Smith & Wenger, 2006). Some recovery activities are reparation or reposition of structures, business reincorporation, the evaluation of existing codes, administrative action to secure funds, and households learning to cope with new stresses (McEntire, 2007; Olshansky *et al.*, 2012; Rubin *et al.*, 1985; Schwab, 1998). Also, according to Schwab (1998), a recovery that fails to consider “any mitigation would defeat the purpose of post-disaster planning” (p. 18). He notes that hazard mitigation is not the main objective of recovery. However, recovery planning should be an opportunity to propose actions that will be further implemented to “prevent future disasters or

minimize their impact" (McEntire, 2007, p. 4). Regarding time frame, some scholars agree that the complete replacement of public and private infrastructure should be accomplished within two years (Comerio, 1998; Inam, 2005). However, Rubin *et al.* (1985) suggest that this timeframe is determined by the type of natural disaster, the extent of damages and the availability of human and material resources. The recovery stage is a complex process that I will further explain.

(4) The reconstruction phase involves long-term development improvements along with commemorative actions. Furthermore, it is a stage where "major reconstruction activities t[ake] place, and future growth and development beg[in] to take hold" (Schwab, 1998, p. 8). The purpose is to reduce vulnerability to promote future growth and development (Olshansky & Chang, 2009; Schwab, 1998). Vulnerability reduction is accomplished through mitigation (Olshansky & Chang, 2009). Hazard mitigation is proactive measures that "avoid, reduce, or eliminate the long-term risk to human life and property from natural or technological hazards" (Godschalk, 2003, p. 138). Mitigation plans identify policies, actions and tools for implementation on an ongoing basis that will reduce risks and loses (Schwab, 1998). The reconstruction period could last between five to ten years depending on the complexity of the proposed measures (Olshansky & Chang, 2009).

The purpose of this project is to study the recovery phase because it provides opportunities at different scales that can aid communities to take care of current needs and also to move forward and be prepared for future disasters (Olshansky & Chang, 2009). From the NDRC, recovery is the "least investigated and the least understood component" (Comerio, 1998, p. 158) among the academic and planning community (Chang, 2010; Rubin, 2009; Schwab, 1998; Smith & Wenger, 2006). Moreover, what is

understood about recovery “is seriously inadequate to the needs we face today” (Rubin, 2009, p. 1)

1.2. Definition of Natural Disaster Recovery

There are no clear parameters on how to measure recovery or “what constitutes ‘successful’ recovery” (Olshansky & Chang, 2009, p. 201). There are two lines of thought about the definition of recovery (*Ibid*). The first line of thought is an early definition of recovery and the most used (Smith & Wenger, 2006). According to this line, recovery considers actions that recreate pre-disaster conditions. This definition also states that recovery is reached when the community has resumed “business as usual”, which means returning to normalcy (Inam, 2005; Olshansky & Chang, 2009; Rubin, 2009; Schwab, 1998; Wachs & Kamel, 1996). By normalcy, scholars mean that the community has resumed the activities they performed before the disaster, like the restoration of jobs, recovery of economic losses, and reestablishment of the transportation system as quickly as possible (Chang, 2010; Inam, 2005; Olshansky & Chang, 2009; Schwab, 1998; Wachs & Kamel, 1996). In these terms, recovery is measured by comparing indicators with the pre-disaster conditions such as population size, restoration of jobs, and replacement of physical assets (Inam, 2005; Olshansky & Chang, 2009).

The other line of thought defines recovery as not returning to normalcy because communities that have been impacted by a natural disaster face changes in the social, economic, and environmental areas, making it unlikely that they will return to pre-disaster conditions (Chang, 2010; Olshansky & Chang, 2009). Manyena, O’Brien, O’Keefe, and Rose (2011) among other scholars, state that returning to normalcy, or “bouncing back” is not always the best approach (Manyena *et al.,* 2011; Smith & Wenger, 2006). Recreating the pre-disaster conditions would reinforce the community’s

vulnerability to natural disasters (Chang, 2010; Manyena *et al.*, 2011). From this point of view, the purpose of recovery is to give opportunities to improve the pre-disaster state (Chang, 2010). Empirical research has proved that successful recovery "often requires adaptation to changed circumstances" (Chang, 2010, p. 305). This means that recovery can be viewed as an approach to find a new state that may differ from pre-disaster conditions. I consider that the latter definition of recovery is more realistic and consistent with the recovery process.

Recovery is an unusual, multidimensional, and complex process that takes into account several actions (Chang, 2010; Schwab, 1998). Claire Rubin (2009), a scholar who has researched recovery for the last 30 years, states that "[r]ecovery will remain problematic for the foreseeable future because it is very messy, difficult to do, and requires long-term attention and resources" (p. 13). She argues that recovery considers so many variables and requirements at the local level, that each community has to define its own recovery process (*Ibid*). Moreover, recovery contemplates not only the replacement of the physical environment but also the reconstruction of people's lives and livelihoods (Chang, 2010). The complexity of the recovery process relates to the "fast-paced [and] information-poor environment" (Olshansky & Chang, 2009, p. 206) where it is developed. Within this environment, local governments must coordinate and implement multiple policies that are formulated and delivered by several actors (Chang, 2010; Comerio, 1998; Olshansky & Chang, 2009). Indeed, municipalities are usually in charge of long-term solutions that can improve the conditions of the affected community (Schwab, 1998).

The most common approach that local governments take to respond to natural disasters is to prepare a plan for the next disaster (Comerio, 1998; Inam, 2005). This means that "the post-disaster period in one disaster is the pre-disaster [period] in the

next disaster" (Zhou, Wang, Wan, and Jia, 2010, p. 29). This approach has two paths. The first one, the most used by local governments, is stand-alone hazard mitigation plans (Berke & Campanella, 2006; Burby *et al.*, 1999). This path usually lacks community involvement (Smith & Wenger, 2006); its focus is on the implementation of hard engineering infrastructures (Comerio, 1998). The premise is that traditional hazard mitigation programs will reduce the costs of reconstruction in a future disaster (*Ibid*). Although it is true that the construction of physical barriers is extremely valuable for cities, these measures are not enough to respond effectively to disasters and uncertainties (Francesch-Huidobro, Dabrowski, Tai, Cham, and Stead, 2017; Godschalk, 2003; Manyena *et al.*, 2011).

The other path that local governments take to respond to natural disaster recovery is the implementation of comprehensive plans (Berke, & Campanella, 2006; Burby *et al.*, 1999; Schwab, 1998). Comprehensive plans bring more resources into implementation and provide a broad understanding of the effects of recovery in other local problematics (Berke & Campanella, 2006). The advantage of this approach is the involvement of "a broader array of community goals, involving a larger number of citizens" (Burby *et al.*, 1999, p. 249).

In sum, natural disaster recovery should consider comprehensive plans that not only propose rebuilding and protecting the physical environment but also provide tools to improve social relationships through community involvement (Burby *et al.,* 1999). The purpose is to prepare communities to respond efficiently to uncertainties to achieve a successful recovery (Manyena *et al.*, 2011). The next chapter presents the case study that will help to understand how the abovementioned approaches are implemented empirically during natural disaster recovery.

Chapter 2. The 2013 Southern Alberta Flood

2.1. The 2013 Southern Alberta Flood

Flooding is the most recurrent natural disaster in Canada (Oulahen, 2015). In the last decade, it has cost billions of dollars to repair the damage that has affected a significant number of Canadians (*Ibid*). I have chosen to study a recent natural disaster, the 2013 Southern Alberta flood, which was cataloged as a catastrophic and unprecedented flood (Haney & McDonald-Harker, 2016). Heavy rainfall and snowpack melting that took place in June 2013 caused overland flooding due to the increase of flow rate of the Bow and Elbow Rivers, two of the largest rivers in the Province (City of Calgary, 2014h). This disaster forced the declaration of 32 States of Local Emergency and the evacuation of 175,000 residents – making it the costliest disaster in Canadian history (Haney & McDonald-Harker, 2016) until the Fort McMurray wildfire occurred. The City of Calgary, the largest metropolitan area in the Province of Alberta (IBI Group, 2015), was profoundly affected by this natural disaster. This flood forced the evacuation of 80,000 Calgarians, emergency response was required across the city, and its downtown district was inaccessible for about a week (City of Calgary, 2014h, Timeline, 2013).

2.2. Research Questions

The purpose of this project was to study what an effective recovery plan should look like from an institutional perspective. I tried to achieve that by researching the implementation of the recovery plan that the City of Calgary crafted to respond to the 2013 flood.

- How should the effectiveness of the City of Calgary recovery plan from the 2013 flood be assessed?
- What lessons can be drawn from the implementation of the 2013 recovery plan in the Hillhurst Sunnyside neighbourhood?
- What lessons learned can be applied in the City of Burnaby regarding natural disaster recovery?

These questions guided research in terms of conceptualization, data collection methodologies, and data analysis framework. Also, I have decided to study the implementation of the recovery plan in a particular community because I believe I would be able to focus on details of the implementation in a specific case which would provide suitable lessons learned to apply to the City of Burnaby. A secondary objective of this research project is to contribute with practical information to the formulation and implementation of recovery efforts that can be useful for planners and the local government. Therefore, this research project will contribute to the recovery literature because it connects with the questions that scholars and planners are currently trying to answer. Planning researchers and practitioners alike have been asking: “What is a ‘successful’ recovery? [...] How effective are recovery plans and policies? […] How can communities become more resilient to disasters [...]?” (Olshansky & Chang, 2009, p. 204).

Scholars are not the only ones trying to define and find effective ways to face uncertainties. Authorities from all levels of government lack the right tools to respond to natural disasters (Smith & Wenger, 2006). Moreover, “relatively few recovery studies are of direct use to planners” (Olshansky & Chang, 2009, p. 202). This phenomenon might be because an operational definition of effective recovery has not been established in the recovery literature or at the governmental level (Rubin, 2009). Therefore, scholars are asking the academic community to conduct empirical research that guides recovery planning and decision-making (Olshansky & Chang, 2009). They also suggest the

collection of lessons learned and the documentation of best practices to understand successful post-disaster responses (Olshansky & Chang, 2009; Rubin, 2009).

Hillhurst Sunnyside is one of the oldest neighbourhoods in Calgary. This neighbourhood was incorporated into the City in 1907 (Hillhurst Sunnyside Community Association [HSCA], 1978). Hillhurst Sunnyside is situated on the river banks of the Bow River across from downtown Calgary (Figure 2). Due to its placement in the Bow River floodplain, Sunnyside has a long history of flooding which goes back to the early 1900's (HSCA, 1978). The 2013 flood was not an exception as "Sunnyside was one of the hardest hit Calgary communities" (HSCA, 2014). To respond to this natural disaster, the Hillhurst Sunnyside Community Association (HSCA) formed a flood task force to support the recovery of community members (*Ibid*). The HSCA is a civic organization that provides services to seniors, youth, and children living in the Hillhurst and Sunnyside neighbourhoods (HSCA, n.d.b).

Additionally, I have chosen this case study because I want to learn about the implementation of a recovery plan in an inner-city neighbourhood. Also, I would like to understand how a local government contends with communities that are constantly exposed to hazards.

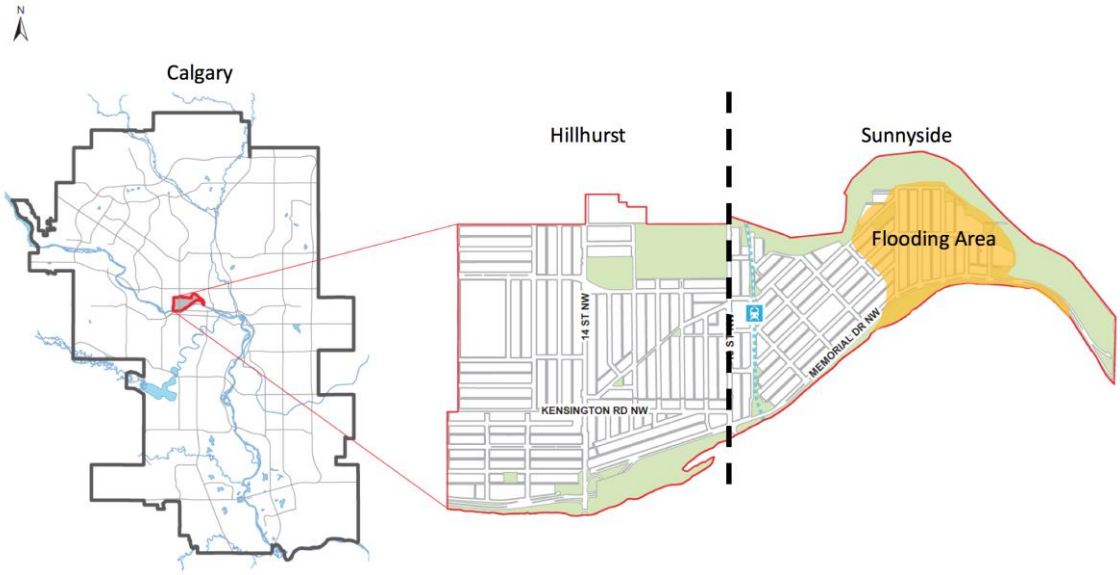

Figure 2: Hillhurst Sunnyside emplacement
Source: Adapted from City of Calgary (2017). Hillhurst- Sunnyside Area Redevelopment Plan.

Chapter 3. Literature Review

In order to frame my questions about the effectiveness of recovery planning in Calgary, the purpose of the literature review is to establish a normative stance about effective recovery planning and what steps should be taken by the local government to achieve success. Therefore, I draw concepts from three bodies of literature – Disaster Resilience, Recovery Planning and the Collaborative Planning Approach, and Effective Institutional Response to Natural Disaster Recovery.

3.1. Disaster Resilience

Socio-ecological Resilience

The first section of the literature review aims to discuss the notion of resilience in the context of disaster recovery. Resilience thinking is an approach that "is increasingly used […] for understanding the dynamics of natural disaster systems" (Zhou *et al*., 2010, p. 21). In addition, urban resilience presents a useful framework to address the impacts of natural hazards (Holden, Robinson, and Sheppard, 2016).

Folke (2016) describes resilience as the "science of surprise" (p. 11), where uncertainty characterizes resilience thinking with respect to resistance to change and recovery from it (Lu, 2014). Resilience entered the field of ecology in the 1970's through the observations of Holling (1973) of living systems, their persistence and approach to reach equilibrium after disturbances (Davoudi *et al*., 2012; Folke, 2016; Holling, 1973). From there, resilience has been attributed multiple meanings that relate to its application in different fields (Davoudi *et al*., 2012). In the social sciences, resilience was applied to understand the "capacity of a self-organising system (e.g., a person, settlement or society) to withstand impacts (e.g., disaster, disease, crisis or natural hazard) without

being destroyed" (Lu, 2014, p. 30). Resilience thinking has expanded to address issues of complex social-ecological systems which approaches the role of institutions and organizations when responding to uncertainties (Folke, 2016).

Pendall, Foster, and Cowell (2010) propose two main lines of thought underlying resilience thinking. The first line is about equilibrium, how systems reach equilibrium as returning to their initial state after disruptions, and how systems absorb disturbances to achieve a new stable state (Pendall *et al.,* 2010). These approaches are denominated engineering and ecological resilience respectively. The other school of thought relates to social-ecological systems where "multiple elements interact to produce dynamic feedbacks making a system more or less adaptable, that is, resilient to stress" (Pendall *et al.,* 2010, p. 27). This line of thought is known as socio-ecological or evolutionary resilience. I will expose each definition to complement the denotation of recovery provided in chapter 1.

Engineering resilience is defined as "the ability of a system to return to an equilibrium or steady-state after a disturbance" (Davoudi *et al.,* 2012, p. 300). This definition focuses on the speed and the resistance of the system to rebound to normalcy or "bounce back" as a measurement of resilience. This can be observed in systems with a single state of equilibrium, such as a body temperature (Pendall *et al.,* 2010).

Holling (1973) discovered that ecological systems – in his case freshwater lakes – have multiple basins of attraction or multiple equilibria (Folke, 2016; Holling, 1973; Pendall *et al.,* 2010). Holling (1973) defined ecological resilience as "a qualitative capacity to devise systems that can absorb and accommodate future events" (p. 21) and maintain a state of equilibrium or stability, which is not necessarily the initial pre-shock condition (Davoudi *et al.,* 2012). In this case, resilience can be measured as the capacity

of a system to absorb disturbances before changing or adapting its structure and "remain within critical thresholds" (Davoudi *et al.,* 2012, p. 300). The difference with engineering resilience is that ecological resilience acknowledges the existence of multiple equilibria (Pendall *et al.,* 2010).

The equilibrium approach of resilience is labelled by Folke (2016) as "a narrow sense" (p. 2). He states that resilience thinking is richer than achieving equilibrium (*Ibid*). It is specifically this approach that the disaster literature proposes (Davoudi *et al.,* 2012; Pendall *et al.,* 2010). According to Pendall *et al.* (2010), this approach measures disaster resilience by learning if the affected city recovered its population, economy and physical environment in quantitative terms. Alternatively, Davoudi *et al.* (2012) declared that returning to normalcy "raises a number of normative issues" (p. 302). Therefore, the resilience thinking approach, according to Folke (2016), deals with true uncertainty and how systems take advantage of those opportunities for improvement.

The other approach of resilience thinking rejects the idea of equilibria. It advocates that social-ecological systems absorb exogenous and endogenous, acute and constant shocks, through a process of transformation and adaptation while they maintain their essential function, structure and feedback (ARUP International, 2014; Davoudi *et al.,* 2012; Folke, 2016). This approach was denominated by Folke (2016) as socio-ecological resilience and by Davoudi *et al.* (2012) as evolutionary resilience. I will use the term socio-ecological resilience because it provides a path that helps to understand the influence of resilience in urban systems, as types of socio-ecological systems.

According to Folke (2016), "[s]ocial-ecological systems are intertwined systems of people and nature embedded in the biosphere" (p. 2). This approach of "humans-in nature" considers the human side of society in its different domains: economic, political,

institutional and cultural (Folke, 2016). Therefore, socio-ecological resilience is defined as the “capacity of a social-ecological system to sustain human well-being in the face of change” (Folke, 2016, p. 8). Focusing on the well-being of people and the planet provides an understanding of the complex interdependencies of social-ecological systems (Davoudi *et al.,* 2012; Folke, 2016). From this point of view, the capacity of society to adapt and transform when facing uncertainty, exogenous and endogenous events, is a sign of resilience (Folke, 2016; Pendall *et al.,* 2010). In socio-ecological resilience, “adaptation refers to human actions that sustain development on current pathways, while transformation is about shifting development into other emergent pathways and even creating new ones” (Folke, 2016, p. 4). These two actions, adaptation and transformation, provide flexibility, the ability to self-organize, learn and innovate that help to build the system’s resilience (Folke, 2016). From this perspective, resilience is understood “as a continually changing process” (Davoudi *et al.,* 2012, p. 304). In other words, resilience is not measured as an outcome but relates to the system’s capacity to “bounce forward” (Manyena *et al.,* 2011, p. 419). This means that the system reaches resilience at different levels when adapting and transforming during disruptions (Davoudi *et al.,* 2012).

The socio-ecological resilience approach considers disruptions as an opportunity to improve the system’s structure and functions, which requires “a great deal of preparedness” (Davoudi *et al.,* 2012, p. 303). Zhou *et al*. (2010) propose four critical factors that help to build resilience in social-ecological systems. Accepting uncertainty requires building a memory of past events that increases the capacity to learn from disruptions. Promoting diversity helps to cope with endogenous and exogenous stresses. Innovation and learning are stimulated through collaborative knowledge

sharing. Finally, self-organization is developed through “community-based management […] which is key to effective response and adaptation” (Zhou *et al.,* 2010, p. 25).

Regarding disaster resilience, Manyena *et al.* (2011, p. 419) propose the notion of “bouncing forward” after a disaster instead of “bouncing back”. This notion conceives disasters “as an opportunity for local livelihood enhancement rather than as a simple return to status quo ante” (Manyena *et al.,* 2011, p. 423). From this point of view, disasters are considered catalysts for change for they open a path to pursue a different state that would not be perceived without the disruption (Holden *et al.,* 2016). That “new” state could only be achieved, according to Manyena *et al.* (2011), by the influence of community advocacy on disaster risk governance. In this case, institutions might be reorganized due to community agency where changes produced after the disaster “are a result of rational choices made by the affected communities” (Manyena *et al.,* 2011, p. 419). This notion of disaster resilience is suitable for the disaster recovery reality because it complements the definition of recovery provided previously.

Alternatively, how can resilience, a concept from the field of ecology, be applied to urban systems? According to the literature, resilience is hard to measure and hard to implement in practice (ARUP International, 2014). Davoudi *et al.* (2012) state that, applying a natural science framework to social science phenomena “can be deeply problematic” (p. 331). There is a risk of failure when trying to explain the complex dynamics of sociopolitical and economic power that shapes cities (ARUP International, 2014; Holden *et al.,* 2016). Some scholars have labelled resilience as a “fuzzy” concept (Lu, 2014; Pendall *et al.,* 2010; Zhou *et al.,* 2010). The lack of definition of this emergent concept leads to the absence of normative thrust that usually leaves the researcher with a considerable amount of work to develop models and indicators (Holden *et al.,* 2016; Pendall *et al.,* 2010).

The systems approach has been useful when applying resilience thinking to urban centres (ARUP International, 2014). However, the development of metrics and indicators is an issue when trying to measure the resilience of social-ecological systems due to their complexity (Folke, 2016). I will draw on the work developed by ARUP International (2014) done on behalf of the Rockefeller Foundation to provide "evidence-based articulation of city resilience" (p. 1) to analyze part of the Calgary 2013 flood case. ARUP International (2014) developed a City Resilience Index (CRI) to inform urban planning practice to enable urban communities to thrive after disruptions. For the development of the CRI, ARUP International (2014) created a framework which analyzed the relationships and performance of the different urban systems that compose a city. This framework proposed that a city is resilient when is able to fulfil critical functions despite disruptions. I will further explain ARUP International's framework, and it will be part of the first layer of the conceptual framework.

Urban resilience

The term resilience was introduced to urban planning in the 1990's (Lu & Stead, 2013). Its focus was on building resilient physical systems that would allow cities to mitigate environmental threats (*Ibid*). Late in the next decade, building resilience was considered as an approach to handle the impacts of climate change (*Ibid*).

Scholars who attempt to identify the presence of resilience in cities have studied the behaviour of urban systems (ARUP International, 2014). According to ARUP International (2014), urban systems "are defined by the particular role which they help the city to perform" (p. 16). In other words, urban systems determine what a city is and what it is able to provide to its residents. In order to understand the complexity of social-ecological systems, cities must be perceived as systems of systems (ARUP International, 2014; Godschalk, 2003; Jabareen, 2013; Olshansky & Chang, 2009). This

perception acknowledges that urban systems are interdependent (ARUP International, 2014). For instance, a severe flood could cause the loss of property and life, which could lead to social disturbances in some neighbourhoods. And it also would affect economic productivity, and economic losses would affect the social and physical realms of the city (*Ibid*).

Going back to socio-ecological resilience, Folke (2016) defines it "as the capacity of a social-ecological system to sustain human well-being in the face of change, by persisting and adapting or transforming in response to change" (p. 8). This means that social-ecological systems sustain ecological systems that support human systems and well-being during and after disruptions (*Ibid*). Therefore, a way to comprehend urban systems is by understanding how cities support human and societal well-being (*Ibid*). From this perception, well-being is understood as "physical and psychological health, material sustenance, and the sense of dignity and belonging that comes with being a recognized member of the community or society" (Folke, 2016, p. 7). ARUP International (2014) identified three categories of urban systems that fulfil residents' well-being. These categories divide urban systems into physical/environmental, social and economic components.

Physical systems constitute the city's infrastructure and the environment (ARUP International, 2014). They are extremely vulnerable to disasters; the failure of these systems would have consequences in the operation of other systems (Manyena *et al.*, 2011; Olshansky & Chang, 2009; Peacock, Dash and Zhang, 2006). A resilient city should consider assets that are adaptive, robust, diverse and redundant, such as power supply and basic provision of food, as well as the protection of human life, physical and environmental assets through traditional hazard mitigation measures (ARUP

International, 2014; Godschalk, 2003). Also, environmental systems can absorb the impacts of natural disasters (*Ibid*).

Social systems compromise human and institutional systems (ARUP International, 2014; Godschalk, 2003). These systems are usually overlooked because they are difficult to identify and measure (ARUP International, 2014). A resilient city has a strong public and private sector that plans ahead and acts spontaneously (Godschalk, 2003). In addition, a resilient city should consider the involvement of the affected stakeholders, especially the most vulnerable communities, during decision making and implementation (Berke & Campanella, 2006; Manyena *et al.*, 2011; Smith & Wenger, 2006). An essential component of social systems when pursuing resilience is to assign "methods for building capacity within the community" (Holden *et al.,* 2016, p. 297) that will prepare them to adapt to disturbances. These methods include learning from past experiences, combining experience and knowledge, promoting innovation and adjusting responses to changing circumstances (Folke, 2016; Innes & Booher, 2000b; Zhou *et al.,* 2010).

Economic systems sustain and support the livelihood of city residents (ARUP International, 2014). A resilient city promotes economic diversification, competitiveness, and entrepreneurship, which are supported by a proactive chamber of commerce (ARUP International, 2014). Resilient economic systems provide a wide range of financial support and employ incremental funding (ARUP International, 2014; Godschalk, 2003).

A resilient city is able to guarantee its citizens and society's well-being through the abovementioned systems, despite disturbances. Moreover, a resilient city, from the socio-ecological perspective, "requires more social and economic than environmental strategies" (Holden *et al.,* 2016, p. 301). From this point of view, natural disasters

provide an opportunity to create meaningful progress in social and economic systems that help to plan for the alternative futures that a city can achieve when adapting and transforming from disturbances (*Ibid*).

Disaster Resilient Cities

The disaster resilience literature presents resilience as the capacity to survive natural disasters without catastrophic failure and the ability to recover in a timely manner with minimal external assistance (Berke & Campanella, 2006; Godschalk, 2003; Greiving, 2016; Jabareen, 2013; Olshansky & Chang, 2009; Zhou *et al.,* 2010). This definition is ambiguous regarding how survival and recovery are achieved. Is it by returning to (new) equilibrium? Alternatively, is it by adapting and transforming urban systems in response to natural disasters? According to Forino (2015) returning to equilibrium considers disaster resilience as an outcome, which ensures small-scale impact buffering that considers top-down strategies. When disaster resilience is considered as a process –adaptation and transformation – the role of social and economic systems is emphasized thereby focusing the attention on the capacity of communities to face disasters (*Ibid*). Adaptation and transformation entail endogenous modifications to behaviour within institutions and communities (Folke, 2016). To sum up, I would define disaster resilience, from the socio-ecological perspective, as: the capacity to survive natural disasters without catastrophic failure and the ability to recover in a timely manner with minimal external assistance. This should consider in addition to strengthening physical systems, the creation of “a greater sense of place among residents; a stronger, more diverse economy; and a more economically integrated and diverse population” (Olshansky & Chang, 2009, p. 201). This approach focuses on the interrelationships that affect recovery, which could help to guide decision-making (Olshansky & Chang, 2009).

To conclude, a disaster resilient city should pursue the following (Table 1):

Table 1: Disaster Resilient City

	A resilient city must	By
Physical	**Deliver basic needs**	guaranteeing provision of food, water, energy despite emergencies
	Safeguard human life and protect assets	protecting the city inhabitants and assets from natural disasters
Social	**Facilitate human relationships**	enabling public participation during decision making and reaching marginalized populations
	Promote knowledge, education and innovation	promoting knowledge that could help to prevent disasters and assist recovery
	Defend the rule of law, justice and equity	proposing equitable policy that protects the less fortunate during and after the disaster
Economic	**Support livelihoods**	maintaining economic activities before and after a disaster
	Stimulate economic activity	strengthening economic competitiveness, diversification

Source: Adapted from ARUP International (2014). City Resilience Index - Research Report Volume 1- Desk Study.

Finally, socio-ecological resilience complements the definition of recovery as "bouncing forward" after disturbances.

3.2. Recovery Planning and the Collaborative Planning Approach

Planning for recovery

The recovery literature regarding planning research is addressing the complexities of natural disaster recovery with two emergent lines of research. The first approach, which was presented in the previous section, studies cities as systems of systems (Olshansky & Chang, 2009). The second line of research tries to understand institutions and planning processes for guiding recovery efforts by public and private

sectors (*Ibid*). This section of the literature review presents the challenges that public actors in collaboration with private sector stakeholders face when planning for recovery.

Communities affected by natural disasters not only suffer from the impact of the disaster itself but sometimes the inability of public and private actors to plan a successful recovery also affect these communities "as the economy stagnates, social networks weaken, and health care and support services decline" (Olshansky & Chang, 2009, p. 200). The concept of time can help to understand the complexity of achieving an effective recovery planning process. Olshansky *et al.* (2012) propose that recovery planning is the "compression of urban development activities in time and in a limited space" (p. 173). Their approach is that disasters disrupt urban systems in an instant, which increases the demand for new capital services, decision-making, information, and funds (Olshansky *et al.,* 2012). The great challenge is to match the need and speed of the planning process. Rubin *et al.* (1985), agree with this statement – time compression – when proposing that, "speed and quality of recovery for communities are major policy issues" (p. 35). The fast-paced environment of recovery planning leaves its leaders with insufficient information to perform decision-making, "because no one yet understands the big picture" (Olshansky *et al.,* 2012, p. 208). Therefore, the ability to achieve a successful or high-quality recovery can be harmed (*Ibid*).

The publication of the American Planning Association, "Planning for Post-disaster Recovery and Reconstruction" considers the abovementioned conditions when planning for disaster recovery (Schwab, 1998). On their review of the current and emergent research on recovery planning, Olshansky & Chang (2009) describe the work of Schwab (1998) as "[a] significant contribution to the literature of postdisaster recovery" (Olshansky & Chang, 2009, p. 204). Schwab (1998) proposes the creation and implementation of recovery plans, which must consider not only the recovery of the

residential but also the economic sector. In order to achieve a successful recovery, according to Schwab (1998), recovery planning should consider the elaboration of a general vision, the designation of a task force, a clear line of reporting, and extensive and effective participatory planning.

Schwab (1998) states that a recovery plan should “ideally be part of a community's comprehensive plan” (p. 65). He claims that a recovery plan should be linked and triangulated to other elements of the city, such as transportation, housing and land use. (*Ibid*). The integration of this plan to other municipal policies brings more resources for implementation, provides access to other planning tools and broadens the understanding of local needs and issues (Berke & Campanella, 2006). Although stand-alone plans are easier to revise, coordinate, and implement, according to Berke and Campanella (2006), in recovery planning evidence supports that stand-alone plans are of low quality and set aside crucial factors of recovery such as mitigation and economic recovery.

According to Schwab (1998), a recovery plan should pay particular attention to mitigation and the recovery of the business community. A recovery plan should identify “operational strategies, and roles and responsibilities for implementation of hazard mitigation elements” (Schwab, 1998, p. 15). Envisioning mitigation during recovery planning enables the community to see their future futures and take advantage of the disruption to fulfil the goals of the comprehensive plan (*Ibid*). On the other side, Schwab (1998) also states that economic recovery is the central component of recovery planning. Economic recovery would accelerate the whole community’s recovery for they would have access to economic resources, like salaries, goods, and services, which assist the physical and social recovery (Peacock *et al.*, 2006). Small and local-oriented business are the most affected by natural disasters due to utility disruption and the loss

of customers (Olshansky & Chang, 2009). Therefore, the business community should be involved to facilitate recovery and collaborate in strengthening the local economy to better respond to future disasters (Schwab, 1998).

Schwab (1998) states that, recovery plans should provide a future vision that will help to anchor decision making and serve as motivation for the current and future community. This vision should provide direction on how to achieve the desired future (Berke & Campanella, 2006). Also, the vision statement should be clear and broad so it can adjust to the changing conditions of recovery (Schwab, 1998; Albrechts, 2010). The importance of a vision statement is that "[i]t points, in a very specific way, to the critical issues and challenges ahead, creating a sense of urgency among as many actors as possible" (Albrechts, 2010, p. 1121). Without a vision statement, the recovery effort could turn into a list of confusing and time-consuming projects that move in different directions (*Ibid*). Moreover, the lack of clear recovery goals can lead to a deficient recovery that translates into the loss of jobs, reduction of housing stock, and inability to assist the most disadvantaged populations (Smith & Wenger, 2006).

Schwab (1998) points out that successful recovery planning relates to having a sense of the big picture but also recovery leaders should be aware of the short-term goals that promote or discourage the achievement of the vision statement. The establishment of short- and long-term goals helps to plan more efficiently during compressed redevelopment (Olshansky *et al.,* 2012). On the one hand, short-term goals help to build trust through solving everyday pressing problems "in view of the realisation of possible futures" (Albrechts, 2010, p. 1123). On the other hand, long-term goals can be further developed and analyzed to achieve a better outcome (Albrechts, 2004; Olshansky *et al.,* 2012). Implementing the recovery vision is difficult due to the fragile

planning environment where the plan is situated (Schwab, 1998). Therefore, focusing on the details of implementation is the center of delivering recovery (*Ibid*).

According to Schwab (1998), the implementation of the recovery plan requires the appointment of a dedicated planning task force and monitoring strategies. A recovery plan should set guidelines to designate and determine the responsibilities of a task force that will focus on the implementation of the plan (*Ibid*). Furthermore, the nature of the recovery response will also depend on the expertise of the task force (Inam, 2005). In this case, an interdisciplinary planning task force should consider governmental agencies but also include representatives of private sector actors from the business community, non-profit organizations, and civic organizations (Schwab, 1998; Smith & Wenger, 2006). Prior training of the involved stakeholders would allow the internalization of the related implementation operations in time of crisis (Schwab, 1998). In addition, the appointment of an accountable task force leader would determine the success of the implementation (*Ibid*). In order to keep the recovery process well-coordinated, the task force leader, in conjunction with the interdisciplinary task force, should "establish the line of reporting and responsibility for implementing recovery" (Schwab, 1998, p. 94). The complexity of the recovery environment would be addressed effectively if monitoring indicators are laid out for the various involved stakeholders (*Ibid*). Monitoring activities consist of assessing the progress of the milestones established in timetables (Morphet, 2011). Monitoring will identify which policies or programs are being implemented, which ones are behind schedule, and if there is the need to amend or replace the latter (*Ibid*).

Collaborative Planning Approach

The recovery planning literature (Berke & Campanella, 2006; Burby *et al.*, 1999; Inam, 2005; Magdefrau & Sprague, 2016; Olshansky *et al.,* 2012; Rubin *et al.,* 1985; Smith & Wenger, 2006), including Schwab (1998), declares that the elaboration of the

recovery plan vision statement and its implementation should incorporate “reasonably extensive and effective opportunities for public input” (Schwab, 1998, p. 95). I draw on the definition of public participation employed by Magdefrau and Sprague (2016). They offer the following working definition of public participation in the disaster studies context: “participation is comprised of the involvement of all relevant and potentially affected individuals, parties and/or organisations in decision-making processes towards reducing disaster risks” (Magdefrau & Sprague, 2016, p. 298).

There are several advantages when pursuing public participation. In the early stages of recovery planning, public participation enables the incorporation of local knowledge and integration of new ideas into the vision statement (Magdefrau & Sprague, 2016; Olshansky *et al.,* 2012). In other words, participation results in decisions that are more relevant and may have a more significant impact on the affected community (Burby *et al.*, 1999; Magdefrau & Sprague, 2016). In some cases, public participation can accelerate the healing process of impacted individuals through meaningful involvement that emphasizes meeting and exchange with other members (ARUP International, 2014; Berke & Campanella, 2006; Comerio, 1998; Magdefrau & Sprague, 2016).

According to Magdefrau and Sprague (2016), complex problems, such as recovery planning, typically require the involvement of a wide variety of stakeholders (also Schwab, 1998; Smith & Wenger, 2006). The authors define these participants as “any person or organisation holding legitimate interest or who might be affected by a given action or policy” (p. 296). Schwab (1998) identifies the involvement of a broad range of stakeholders that besides public agencies includes non-governmental organizations, civic organizations, and the business community. The “right mixture” of these stakeholders will be determined by the history, nature of the hazard and available

resources of the impacted community (*Ibid*). This mixture is what some scholars have called the governance landscape (Francesch-Huidobro *et al.*, 2017). Governance relates to public policies that are planned and implemented by public agencies in collaboration with private stakeholders, which altogether aim to achieve a common purpose, which could not be accomplished in another way (*Ibid*).

Magdefrau and Sprague (2016) state that there are two types of participation methods: one-directional and two-way communication pathways. One-directional communication forms are considered as a passive form of participation because participants have "little to no input or influence in the decision-making process" (Magdefrau & Sprague, 2016, p. 300). For instance, information events only give the knowledge that citizens need, but there is no dialogue (*Ibid*). Consultation events, like public hearings, are also considered one-way pathways of public participation (Innes & Booher, 2005; Magdefrau & Sprague, 2016). These events are used after plans or decisions are proposed, and the role of residents is to react (Innes & Booher, 2005).

Two-way communication methods require a higher level of involvement of players (Magdefrau & Sprague, 2016). Active involvement, such as roundtables, enable the direct discussion of people's concerns and aims to "work towards a mutual consensus" (Magdefrau & Sprague, 2016, p. 302). Another method, shared decision-making, such as citizen-led committees, allow citizens to collaborate with government officials in the process of decision-making (*Ibid*). Although there is a greater degree of involvement among participants, the main issue is that "more often than not, [it is] made up of elites, and [it is] not representative of a range of interests and voices" (Innes & Booher, 2005, p. 423). Schwab (1998) declares that recovery issues should be addressed "through some type of public action [that is meaningful and produces] a plan that reflects the informed wisdom of the community as a whole" (p. 83).

Meaningful public participation is hard to achieve because it is expensive and time-consuming (Innes & Booher, 2000a; Magdefrau & Sprague, 2016). Moreover, Magdefrau and Sprague (2016) state that public participation cannot guarantee desired results because “it is impossible to satisfy everyone who participates in the planning process” (p. 312). Nevertheless, the collaborative planning approach proposed by Innes and Booher (2000a; 2000b; 2005; 2016) points to building consensus where the involved parties can be satisfied with the process or the outcome. Innes and Booher (2000a; 2000b; 2005; 2016) have developed the collaborative planning approach through years of practice and first-hand research that help to explain why this approach is more productive than the one-directional and two-way communication pathways (traditional methods). The authors (2000b; 2005; 2016) state that traditional methods do not achieve genuine participation which affects the outcome of public officials’ decision making. Moreover, traditional methods “do not satisfy members of the public that they are being heard” (Innes & Booher, 2005, p. 419) and lack the involvement of the most disadvantaged members of society (Innes & Booher, 2000b).

The collaborative planning approach is an expression of governance. At its fullest expression, the collaborative approach encourages the involvement of diverse participants where public officials and ordinary people have equal conditions to contribute (Innes & Booher, 2000a; 2005; 2016). This strategy does not allow for position-taking (*Ibid*) because what ordinary people “know is at least as relevant as what is found through systematic professional inquiry” (Innes, 1995, p. 184). In this sense, a collaborative planning approach is more inclusive because participants are more representative (Innes & Booher, 2005; 2016). This approach also moves towards fairness due to the emphasis that must be put on assisting financially and technically disadvantaged stakeholders to ensure their participation (*Ibid*). In addition, the

collaborative approach promotes face to face dialogue that focuses on mutual learning which in turn can help to reframe complex problems into more manageable ones (Innes & Booher, 2000a; 2016). In the end, agreements are reached when a great portion of participants are satisfied, and “when someone does not like the final result they may accept the fairness of the decision if they have had some impact on the final package” (Innes & Booher, 2005, p. 429).

The authors (2000a; 2000b) point out that there is an uphill battle to implement the collaborative planning approach in decision-making processes in most levels of government. This approach does not fit into the “hierarchical bureaucratic agencies, guided by strict mandates” (Innes & Booher, 2000a, p. 18) structure of government because there is a clear separation between public and private stakeholders. According to Innes and Booher’s (2016) experience, these barriers can be overcome. For instance, if an issue is controversial enough, government officials may decide to use this strategy (*Ibid*). In addition, the authors (2000a) state, based on their experience, that when dealing with uncertainty and with issues of public pressure this is “the only approach that can produce a satisfactory result” (p. 23).

Another difference with traditional methods of public participation is that the collaborative planning approach in its promotion of diversity requires not only the inclusion of ordinary people but also the participation of relevant stakeholders (Innes & Booher, 2005). One reason for the inclusion of a diverse landscape is because it provides access to a range of skills and knowledge that can increase the creativity and innovation necessary to address the issue (Innes & Booher, 2000a; 2000b). The collaborative approach is a multiway dialogue where participants can recognize their interdependency (Innes & Booher, 2000b). It means that stakeholders must know that they cannot meet their interests working alone and that they need each other to reach

the desired outcome (*Ibid*). At the same time, some participants may be able to achieve their objectives alone, and others may not care about collaboration (*Ibid*). Interdependency would allow participants to "collectively […] create an adaptive learning system" (Innes & Booher, 2000b, p. 7) which would better respond to disruptions.

This multiway dialogue allows parties to learn about others' interests rather than their positions (Innes & Booher, 2000a). Furthermore, participants learn "as individuals and as a group about the problem, their goals, perspectives of other participants, and their shared context" (Innes & Booher, 2016, p. 9). According to Innes and Booher (2000a), an adaptive learning system is well-networked which means that information can easily flow through the system. The greater outcome of the collaborative planning approach is the creation of new professional and personal relationships (Innes & Booher, 2000b; 2005). The establishment of new networks among participants "increase[s] the distribution of knowledge among these players" (Innes & Booher, 2000b, p. 5) which helps to build considerable trust that can influence a change of behaviour among participants (Innes & Booher, 2000a; 2005).

Innes and Booher's (2016) research found that participants working to solve complex problems have "realize[d] they will have to work in a completely different way if they are going to manage the problem" (p. 9). The creation of networks increased an empathetic understanding of the particular point of view of other players because they have learned about each other's context and history (Innes & Booher, 2000b; 2005). An outcome of this phenomenon is a greater incentive for participants to seek mutually beneficial solutions (*Ibid*). Through this process, participants may discover that "they can make modifications in their behaviour which may be of little cost or importance to them, but of great benefit to another player" (Innes & Booher, 2000b, p. 10).

The other outcome of the collaborative planning approach on social systems is the construction of societal capacity (Innes & Booher, 2000a; 2005). Innes and Booher's (2000a) working definition of capacity is "the interaction of human […], organizational […], and social capital existing within a given community that can be leveraged to solve collective problems and improve or maintain the well-being of a given community" (p. 8). They suggest that the use of the collaborative planning approach can change the idea of governance because this approach leads to breaking down institutional barriers towards productive problem solving (*Ibid*). Furthermore, the idea of bureaucracies in "silos" is defeated by the collaborative approach because information flows freely through networks (*Ibid*).

The authors (2000a; 2005) aim to build the capacity of the governance system. Innes and Booher are aware that "[c]apacity, of course, is not an absolute but a relative quality" (Innes & Booher, 2000a, p. 15). Nevertheless, the authors provide a description of governance systems with capacity that is similar to Zhou *et al.*'s (2010) proposal of factors that help to build resilience in social-ecological systems – constant learning, diversity, innovation and self-organization. For Innes and Booher (2000a; 2005) a governance system with capacity (1) encourages stakeholder diversity and makes sure parties are informed and empowered (*Ibid*). (2) The system is constantly learning about others' interests; participants are more knowledgeable and competent to address complex problems (Innes & Booher, 2000a; 2005). (3) Diversity and constant learning can improve the innovation ability of the governance system (*Ibid*). (4) A well-networked system facilitates communication, mutual trust and shared understanding (Innes & Booher, 2000a). As a result, each participant is capable of self-organizing, according to the changing circumstances based on their collective view of the system (*Ibid*). Finally, Innes and Booher (2000a) declare that "[a] governance system with capacity is resilient"

(p. 18) because it responds promptly to disturbances, it adapts its procedures and relationships as needed.

This section, recovery planning and the collaborative planning approach, presented the steps that public agencies should consider when planning for natural disaster recovery. To sum up, an effective recovery plan must be part of a comprehensive plan that is linked to other urban policies. This plan should include mitigation guidelines and the recovery of the economic system. Additionally, the main components for a successful implementation of the recovery plan are a vision statement, short- and long-term goals, a dedicated interdisciplinary task force and constant monitoring. When it comes to public participation, the leading agency should use a multiway communication method, such as the collaborative planning approach that should focus on building governance capacity. This approach moves around the interaction of diverse stakeholders that are interdependent, which are constantly learning and creating new networks. That, in turn, leads them to innovate and adjust their conduct to ensure the well-being of the governance system. The abovementioned concepts contribute to the construction of this project's conceptual framework.

3.3. Effective Institutional Response to Natural Disaster Recovery

Recovery: Urban redevelopment compressed in time

As aforementioned, there is no operational definition of effective recovery planning at the academic and governmental level (Rubin, 2009). However, the concept of time compression is an approach that can also provide useful insights regarding which processes a local government should consider to achieve an effective recovery (Olshansky & Chang, 2009). The disruption, when the natural disaster damages what

takes decades to develop, opens what disaster studies scholars call a window of opportunity (Olshansky *et al*., 2012). This window is a brief period that gives an opportunity for authorities to solve pressing problems (Berke & Campanella, 2006; Inam, 2005; Smith & Wenger, 2006).

However, this window does not stay open for long. Experience from past disasters "has shown that government commitments to recovery wane as time passes" (Comerio, 1998, p. 27). Therefore, authorities should be prepared to respond in a timely manner because natural disaster recovery is urban redevelopment compressed in time (Berke & Campanella, 2006; Olshansky *et al.*, 2012). The way authorities and the community respond to this compressed urban redevelopment would determine how successful the recovery is (Olshansky *et al.*, 2012). The recovery literature specifies several components that should be present in effective recovery planning. Based on the definition of recovery in this project, "bouncing forward", the measurement of effective recovery is rooted in the institutional processes of recovery. Therefore, these signs of effective recovery "are best considered in combination with each other, rather than in isolation" (Inam, 2005, p. 50).

Signs of effective recovery planning

Scholars agree that strong intergovernmental relationships are crucial for effective recovery (Comerio, 1998; Greiving, 2016; Inam, 2005; McEntire, 2007; Olshansky *et al.*, 2012; Rubin, 2009; Rubin & Barbee, 1985; Rubin *et al.,* 1985; Schwab, 1998; Smith & Wenger, 2006; Tesliar, Kuceravcova, and Dzurdzenik, 2016; Wachs & Kamel, 1996). Those relationships can only be achieved through efficient channels of communication (Inam 2005; McEntire, 2007; Olshansky & Chang, 2009; Olshansky *et al.,* 2012; Rubin *et al.,* 1985; Wachs & Kamel, 1996). To take advantage of the opportunity window institutions usually adapt their procedures to facilitate the flow of

information and funds (Inam, 2005; Neal, 1995; Olshansky & Chang, 2009; Smith & Wenger, 2006). Economic assistance is also essential for recovery because if development requires funding, redevelopment compressed in time demands the allocation of massive funding (Comerio, 1998; Inam, 2005; Smith & Wenger, 2006). Another way to take advantage of the opportunity window is for communities exposed to hazards to have in place pre-disaster plans that outline recovery operations and that propose the improvement of urban systems (Berke & Campanella, 2006; Inam, 2005; Neal, 1995; Olshansky & Chang, 2009; Rubin & Barbee, 1985; Rubin *et al*., 1985; Schwab, 1998; Smith & Wenger, 2006).

Rubin *et al.* (1985) state that, to improve the speed and quality of recovery local governments should pursue "more productive intergovernmental relationships in post-disaster recovery, to compete for scarce resources, and to enhance community level decision-making" (p. 59). Some scholars present intergovernmental relationships as institutional coordination which considers vertical and horizontal integration (Inam, 2005; Wachs & Kamel, 1996). Vertical integration refers to the connection of the affected local government with provincial and federal agencies, and its purpose is to facilitate the formulation and delivery of the recovery plan as well as the allocation of funds (*Ibid*). Horizontal integration relates to the degree of coordination among all local agencies (local planning agencies, non-profit and private sector agencies) which are linked through a flow of information, shared resources, and mostly, to the impacted community (*Ibid*). Horizontal integration is particularly necessary for the formulation and also the implementation of the recovery plans because it allows for the creation of a more comprehensive plan (Inam, 2005).

Olshansky and Chang (2009) state that efficient channels of communication are crucial because "[i]n a high-speed planning environment, the speed of information flows

among planning entities is the most significant constraint to the effectiveness of plans" (p. 208). Communication facilitates the coordination among all the involved stakeholders (McEntire, 2007). Efficient channels of communication should allow a smooth flow of information and funds (Olshansky *et al.*, 2012). Channels of communication should be in place before and after the disaster (Olshansky *et al.*, 2012; Wachs & Kamel, 1996). Frequent formal and informal contact between personnel within and among organizations promotes communication (McEntire, 2007). Channels of communication between government officials and the affected community should also be in place to facilitate public participation (Olshansky *et al.*, 2012).

Bureaucratic procedures by nature are hard to compress in time because they require numerous checks and multiple approvals (Neal, 1995; Olshansky *et al.*, 2012). Therefore, according to Inam (2005), the common approach to responding to the opportunity window is the adaptation of the institution's existing procedures instead of creating them from scratch (*Ibid*). Institutional behaviour in post-disaster response can be "predicted" according to what they did before the disaster (*Ibid*). This means that the opportunity window does not give place to propose new and innovative ways to tackle the disturbance (Inam, 2005; Olshansky *et al.*, 2012). Nevertheless, Olshansky *et al.* (2012) propose that these procedures "need to encourage improvisation to be effective under time compression" (p. 177) so they can minimize or modify steps that do not compress well in time (*Ibid*). Inam (2005) points out that a way to measure the adaptation or compression of procedures is by observing the "speed of actual institutional performance compared to regular procedures for accomplishing the same task" (p. 48).

Disasters are costly (Inam, 2005; Smith & Wenger, 2006). In many cases, recovery financing exceeds the local government budget (Smith & Wenger, 2006). There

are two sources of economic assistance for recovery: public funds and disaster insurance (Comerio, 1998). According to Comerio (1998), funding effective recovery is the product of a “highly interdependent” (p. 23) relationship among the different levels of government and insurance companies. Comerio (1998) declares that public funds should be destined for the reparation and restoration of public infrastructure and to assist low-income homeowners and renters who are unable to afford disaster insurance. Recovery of private properties, like businesses and housing, should be covered by private insurance (*Ibid*). Therefore, a recovery plan should assist the insurance industry in extending their coverage for residential and commercial properties (*Ibid*).

Recovery planning actors face a crossroad during recovery because they need to plan as quickly as possible, but they also need to consider “local livelihood enhancement” of the affected community (Manyena *et al.,* 2001, p. 423) (also Berke & Campanella, 2006; Comerio, 1998; Olshansky *et al.*, 2012; Rubin *et al.,* 1985; Schwab, 1998). On the one hand, Rubin *et al.,* (1985), propose the preparation of a pre-disaster plan that should consider responses for the natural disaster response cycle – emergency, restoration, recovery, and reconstruction (also Berke and Campanella, 2006). On the other hand, Inam (2005) suggests the creation in advance of planning proposals that improve the conditions of physical, social and economic urban systems of hazard-prone areas. The creation of both types of plans is extremely valuable for communities. Research has proven that communities that achieved a successful recovery had guiding strategies in place that provided a future image of the community which produced longer-term results (Rubin *et al.,* 1985; Schwab, 1998).

This final section of the literature review, signs of effective recovery planning, defines processes that must be considered to develop successful recovery planning. This is another layer of the conceptual framework. Therefore, in order to assess the

effectiveness of the planning process, I will analyze whether the City of Calgary had in place vertical and horizontal governmental relationships and effective channels of communication; if there was adaptation or improvisation of procedures; the allocation of massive funding; and if the City prepared pre-disaster plans. To conclude, I propose a two-layer conceptual framework that contemplates recovery outcomes and recovery processes.

3.4. Conceptual Framework

The review of natural disaster recovery literature guided me to propose a working definition of effective recovery and aided me with the creation of a conceptual framework to test with the Calgary case study.

I propose the following definition of effective recovery that it is based mainly in the disaster resilience cities literature in addition to the incorporation of concepts from the collaborative planning approach. For this research project an effective recovery is: the capacity to survive natural disasters without catastrophic failure and the ability to recover in a timely manner with minimal external assistance, which should consider in addition to strengthening physical systems, the development of governance capacity that assists social and economic systems in their adaptation and transformation processes to respond to natural disasters.

The analysis of the Calgary case study is from an institutional perspective. This means that I will analyze and discuss the approach that the City of Calgary pursued to plan and implement its recovery from the 2013 flood. Post-disaster scholars provide their own framework when it comes to analyzing effective recovery plans. Their frameworks consider different analytical layers of local government response, such as the policy itself and the institution's political environment (Comerio, 1998; Inam 2005). Most of

them do not touch on the implementation of the plan. Therefore, from the review of the relevant literature, this research project uses a two-layer conceptual framework (Table 2). According to Howlett, McConnell and Perl (2015), policy-making frameworks must have a logical interconnection among their parts and the ability to test them against theoretical stances and empirical events. Regarding interconnection, the analysis of effective recovery planning should consider what was done and how it was achieved. Therefore, the conceptual framework proposes the examination of recovery outcomes and processes. In terms of testing the framework, I propose objectives and its corresponding indicators that help to compare theory and reality. The first layer, recovery outcomes, is drawn in combination with literature regarding urban resilience, recovery planning and the collaborative planning approach. The second layer, recovery processes, relates to time compression and recovery planning concepts. Together, the concepts and indicators in both the recovery outcomes and the recovery processes layers constitute the understanding of effective recovery planning that I examine in this thesis, and in the case of Calgary.

Table 2: Conceptual Framework

RECOVERY OUTCOMES

Macro area	Objective	Indicator
Physical	Protection of human life and assets	Mitigation plan
Social	Promotion of knowledge and networks among affected and relevant stakeholders	Building governance capacity
Economic	Supporting local economy	Assisting local businesses

RECOVERY PROCESSES

Macro area	Objective	Indicator
Planning compressed in time	Pre-planning	Creation of NDRC and local enhancement plans
	Intergovernmental relationships	Previous channels of communication
	Compression of bureaucracy	Adaptation/improvisation procedures
	Massive funding	Claiming for public funds and insurance
Implementation recovery plan	Vision statement	Vision
		Integration with other municipal policies
		Short/long-term goals
	Dedicated task force	Interdisciplinary task force
		Monitoring

Source: Own preparation

Chapter 4. Research Design

This research project is a descriptive single-case study, which is a multi-method research approach to collect and analyze qualitative data (Babbie & Benaquisto, 2002). According to Yin (1998), the purpose of case studies is to apply the principle of triangulation that consists in “ask[ing] the same questions to the different sources of evidence” (Yin 1998, p. 233). Furthermore, Stallings (2006) states that in disaster studies triangulation offers the most confidence in the “validity of the conclusions drawn” (p. 56). Regarding data collection, I employed methods that were used by other scholars when researching successful recovery case studies (Inam, 2005). These methods include analysis of official documentation and newspaper accounts, semi-structured interviews, and site visits.

The development of research methods was sequential, where the findings of the previous method informed the following one (Gaber & Gaber, 1997). Therefore, first, I studied the recovery plan itself to understand its components. Yin (1998) declares that the analysis of documentation is relevant to every case study. However, there might be certain precautions when analyzing these sources for they can be biased (*Ibid*). Therefore, to build construct validity and avoid biased information I collected data from official documentation and a range of news media accounts. Once I had a complete picture of the recovery plan from these sources, I collected information about the policy-making process. I interviewed actors from the City of Calgary, the Hillhurst Sunnyside Community Association, and the business community. I also requested appointments with representatives from the provincial government and City Councillors, but I received no reply. The last methodological step was site visits, which served to corroborate the information provided by the other methodologies.

4.1. Sources of Evidence

Documentation

Data collection from official documentation and media reports required an initial conceptualization to choose the sampling and analysis method. Since the unit of analysis was the recovery plan, I did not use a sampling method for the official documentation. I analyzed documentation produced by the City of Calgary and the Province of Alberta such as update reports on recovery, monitoring reports concerning recovery plan goals and finance, mitigation reports, policy and bylaw amendments, City Council minutes, implementation plans, and lessons learned briefings. These documents were publicly available on the institutions' website, so there was no need to ask for permission

I chose to collect media accounts from Calgary's highest circulation newspaper, the Calgary Herald (News Media Canada, 2017). I set a probabilistic sampling method, simple random sampling. The analyzed time frame was from June 2013 until December 2015, when recovery efforts ceased (Interview 2). Keywords that were used for the sampling method were Hillhurst Sunnyside, 2013 flood, recovery, and so on. Media reports were publicly available through the source's website. Documentation collection took place intensively in December 2017 and January 2018.

Interviews

The recommended sampling method is snowballing, which is described as "using one contact to help you recruit another contact, who in turn can put you in touch with someone else" (Valentine, 2005, p. 117). Through this method, I conducted ten interviews that lasted 50 minutes average (see Appendix C and D). Interviews were tape recorded and transcribed within 72 hours from collection.

Limitations of this method relate to the flood time frame; this event occurred five years ago. Therefore, it was hard to contact all the involved participants because they no longer worked or volunteered at the City of Calgary or the Hillhurst Sunnyside Community Association. Another constraint was that participants had a hard time recalling details about timeframes and involved stakeholders. This shortcoming was addressed by comparing the collected data with official documentation and media reports. In cases where I was not able to cross-check the information, I mentioned them in the report if it was relevant enough. One last limitation was that there were a few contradictions among City employees. This relates to the position that City staff had. For instance, subject matter experts were direct and open about failures. In contrast to managers that were potentially avoiding direct answers. Finally, I visited Calgary to conduct interviews and site visits from the first week of February until the first week of March 2018. Interviews regarding the City of Burnaby were conducted in March and April 2018.

Site visits

Yin (1998) states that observations should be conducted by more than one observer to increase reliability. However, that was not possible in this research. Therefore, I recorded observations through pictures that are presented in the next chapter. I performed two site visits at Hillhurst Sunnyside. The first one was on February 13th at 9:00 am, which was guided by an HSCA member. The second visit was by myself on March 1st at 5:00 pm. There were no signs of flood damage, which was further corroborated by HSCA members (Interview 8). Nevertheless, site visits were critical to understanding protection measures that the community has actively advocated for.

Chapter 5. Calgary's Natural Disaster Recovery Case Study

I conducted a systematic analysis of all sources of evidence. According to Yin (1998), "[a]nalyzing case study evidence is especially difficult, compared to other methods, because strategies and techniques have not been well developed" (Yin 1998, p. 250). Some of the analytical steps to follow are to inspect, categorize, tabulate, and recombine the collected data (*Ibid*). Therefore, as I collected data, I synthesized it to conduct the analysis. Then, I used the concepts from the conceptual framework to create codes and memos (Babbie & Benaquisto, 2002). Yin (1998) suggests following pattern matching as an analysis activity. Pattern matching compares what the theory on the topic (initial proposition) says and what the empirical evidence demonstrates. That is to move from the initial theoretical statement to the findings, then to revise that statement, to then compare other details of the case study (Inam, 2005). Therefore, I moved from the conceptual framework to the collected data, to the research questions, and so on. Finally, to ensure that the analysis had been consistent, I focused on asking the research questions to all sources of evidence to "show that the analysis didn't merely follow the path of least resistance" (Yin 1998, p. 255).

Data was managed through a standard software. I used Microsoft Word files to synthesize data from official documentation and media reports. I also used Word files for interview transcriptions. Information was analyzed through tables that were created in Microsoft Excel.

5.1. Analysis

Overview

On June 20th, 2013, Calgarians woke up to what would become an unprecedented and catastrophic natural disaster (City of Calgary, 2014h; Timeline, 2013). The large scale of the 2013 flood relates to heavy rains on melting snowpack over the Rocky Mountains (City of Calgary, 2014h; Government of Alberta, 2013b). As a result, the flow rate of the Bow River was eight times its regular flow; and the flow peak of the Elbow River was 12 times its normal rate (Government of Alberta, 2015b). This flood was cataloged as a 1:100 year flood; this is an event that has a probability of happening of 1% every year (City of Calgary, 2014h). By June 21st, some houses flooded to waist level above main floors, several roads were closed, and downtown Calgary was inaccessible (McClure, 2013a; Timeline, 2013). The interruption of economic activity "was so large that it reduced Canadian GDP by $2 billion dollars" (Calgary Chamber of Commerce [CCC], 2014b). Besides the extensive damage to public and private property (City of Calgary, 2014h), Calgarians had to deal with the emotional loss of personal valuables (Interview 7) "like pictures and [their] whole history, huge parts of their lives were lost" (Interview 8).

Regarding government response, the Federal government diligently approved the allocation of disaster relief funds for the Southern Alberta flood in eight days ("Speedy disaster relief", 2013). This response is unprecedented in comparison to the average of 297 days response of the Government of Canada to previous disasters (*Ibid*). At the provincial level, the Government of Alberta created a recovery framework and a recovery plan which guided how the Province would support impacted communities (Government of Alberta, 2013a, b). The primary purpose was to provide appropriate funding and recovery support to impacted communities and individuals; as well as to

ensure flood hazard mitigation and response strategies to future events (Government of Alberta, 2013a). The provincial government assigned recovery coordinators as the primary point of contact to assist communities in their recovery (Government of Alberta, 2013a; 2013b). Regarding recovery funding, the Province provided the following programs: Disaster Recovery Program (DRP), Municipal Staffing Capacity Grant (MSCG), Flood Readiness Grant, Flood Recovery Erosion Control, Tax Relief, and Alberta Community Resilience Program (ACRP).

The local government response to the flood began with the opening of the Emergency Operations Center (EOC) on June 20th (Timeline, 2013); which coordinated emergency response with several internal and external stakeholders (Interview 5). The city of Calgary emergency and restoration response was not only assisted by the local government but also by the volunteering spirit of Calgarians (Interview 4; Markusoff, 2014a; Vroegop, 2014). According to news media accounts (Markusoff, 2014a) thousands of volunteers offered their help when the City requested only 600 volunteers (Vroegop, 2014). Also, the presence of oil and gas companies in the city was an important resource because they enabled and equipped volunteers to proceed effectively with emergency and restoration activities, including lending machinery and offering financial support (*Ibid*).

On July 20th, the City of Calgary (CC) issued a State of Local Emergency (SOLE) that lasted until July 4th (City of Calgary, 2013b)**.** The declaration of a SOLE required the activation of the Municipal Emergency Plan (MEP), which was deactivated in June 2015 (Calgary Emergency Management Agency [CEMA], 2010; City of Calgary, 2015f). MEP activation allowed the CC to transition from emergency response and restoration to the phases of recovery and reconstruction from the NDRC (Figure 1) (City of Calgary, 2014j). Recovery and reconstruction were directed by the Recovery

Operations Centre (ROC) that was enabled as part of the MEP (City of Calgary, 2015h) (Figure 3). The Calgary Emergency Management Agency (CEMA) developed a Recovery Operations Centre Resource and Response Manual (ROC Manual) that guided the initial implementation of ROC (Interview 7). This manual stipulated the activation of the ROC Steering Committee. The Administrative Leadership Team (ALT) undertakes the role of the ROC Steering Committee (City of Calgary, 2010a). The ALT is made up of "the administrative heads of each department within the Corporation" (City of Calgary, 2010a, p. 11). In addition to ALT, the ROC Steering Committee was comprised of CEMA, the Chief of Fire, the City Solicitor, the Mayor's Office, the Director of Communications and Customer Services, the Chief Financial Officer, and representatives from Law (City of Calgary, 2015h; Government of Alberta, 2015b; Vroegop, 2015). The overall role of the ROC Steering Committee was to direct recovery decision-making (City of Calgary, 2010a).

The ROC Steering Committee appointed a Recovery Director on July 4th (City of Calgary, 2013a; 2015h). This director was a transferred City employee with a background in emergency management (Interview 7). The mandate of the Recovery Director was to oversee the implementation of municipal recovery efforts (City of Calgary, 2015d). The Recovery Director was assisted by an Administrative office that coordinated recovery actions (City of Calgary, 2014l; 2015h; Personal e-mail, Feb 07). Recovery implementation was accomplished by the Flood Recovery Task Force (FRTF). This interdepartmental task force was established in July 2013 (City of Calgary, 2014l). It compromised representatives from several business units (City of Calgary, 2013a; Interview 7; Jacobs, 2014). The role of this team was to "provide citizen-centric services to Calgarians, monitor and support recovery staff in all City business units, optimize resources and process efficiencies, manage financial impacts" (CEMA, 2015, p. 27). The

first assignment of the FRTF was to develop a 2013 Flood Recovery Framework (recovery framework) (City of Calgary, 2013a; Vroegop, 2015). Based on this framework, the task force met weekly, reported biweekly to the ROC Steering Committee and quarterly to Council and the provincial government (City of Calgary, 2013a; 2014g). The recovery framework was adapted from the ROC Manual (Interviews 5; 7); and it was approved on September 3rd, 2013 by City Council (City of Calgary, 2013a; 2014m).

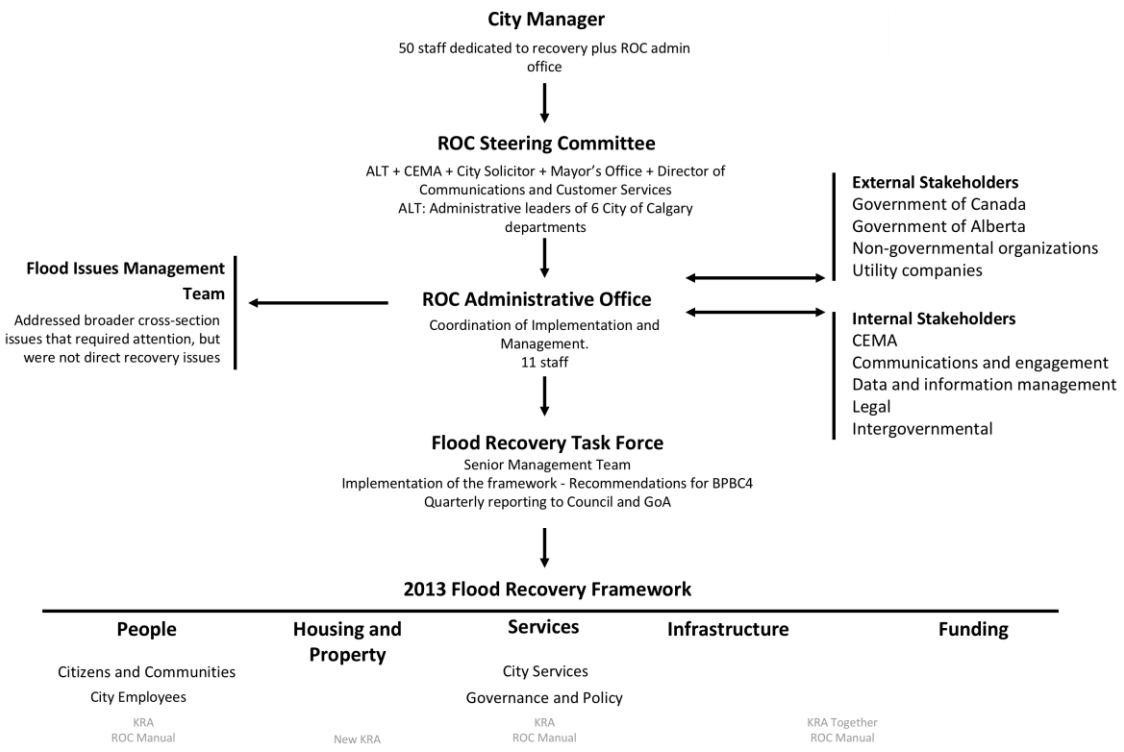

Figure 3: Recovery Operations Centre
Source: Own elaboration based on City of Calgary (2013b) 2013 Flood Recovery Task Force Update Report; Government of Alberta (2015b) Municipal excellence network; Interview 7; Vroegop (2015). The Road to Recovery: The City of Calgary and the 2013 Flood.

The recovery framework established the FRTF mission, recovery definition and guiding principles; it identified priorities, timelines, and provided performance metrics for monitoring and reporting (City of Calgary, 2013b). This strategy identified five Key Result Areas (KRAs): People, Housing and Property, Services, Infrastructure, and Funding, that

guided municipal recovery efforts. The recovery framework KRAs considered the following objectives:

- People: support Calgarians as well as City employees;
- Housing and Property: assist impacted property owners through their recovery;
- Services: direct the delivery of City services and also collaborate with different stakeholders to identify legislative recommendations and amendments;
- Infrastructure: assess damaged infrastructure and guide its reconstruction;
- Funding: balance recovery funding with regular City activities. (City of Calgary, 2013b; Government of Alberta, 2015b).

Some of the CC accomplishments in these KRAs were: (1) People. Hosting information sessions for the affected communities, the implementation of a non-profit preparedness table, the creation of Ready Calgary which is a preparedness program for communities, and the celebration of Neighbour Day on the Saturday closest to the flood anniversary; as for City employees the implementation of Human Resource policies during the activation of the MEP; (2) Housing and Property. The promotion of the provincial tax relief program for affected property owners, and the Flood Permit Grant Program which was a partnership with the Red Cross to waive permit fees to repair damages of single family and semi-detached residential properties; (3) Services. The creation of a business continuity policy, and land-use policy changes regarding future development on the floodway; (4) Infrastructure. The Municipal Infrastructure Recovery Program and the creation of an external Expert Management Panel on River Flood Mitigation; (5) Funding. The City filed insurance claims, uninsurable costs were submitted to the provincial Disaster Recovery Program, and improvement or “build back better” actions were funded with the municipal Fiscal Stability Reserve (City of Calgary, 2014h, m; 2015f, h; Vroegop, 2015).

Objectives and deliverables of the recovery framework were projected for 18 months (Interview 2; Vroegop, 2015). However, the ROC was formally closed in June 2015; it was active for 24 months (City of Calgary, 2014m). Moreover, part of the ROC Administrative office staff went on for three years (Interview 2). On those extra months, ROC completed the remaining deliverables, reported on lessons learned and developed recommendations to inform future recovery (City of Calgary, 2014m). Another assignment of the FRTF was to provide recommendations regarding recovery, mitigation, and resilience for the City's Business Plan and Budget Cycle 4 for 2015-2018 (BPBC4) (City of Calgary, 2013b, d). Since 2009, the City employs a three-year business planning and budgeting process that it is monitored annually (City of Calgary, 2011). Therefore, part of the recovery framework deliverables and BPBC4 recommendations of the FRTF transitioned in June 2015 from the ROC to specific business units (City of Calgary, 2015d, f). The recommendations that the FRTF provided for the BPBC4 were: "Priority N2: Build resiliency to flooding and N3: Enhance The City's capacity and resiliency to prepare for and respond to pandemics, natural disasters and emergency situations." (City of Calgary, 2014m, p. 9). In addition to the FRTF, the CC set up a Flood Issues Management Team at the director level to deal with flood concerns that were not directly related to recovery, such as the 2014 Spring snow melting preparation (Vroegop, 2015).

CEMA and ROC conducted an internal and requested an external report, to the Conference Board of Canada, on lessons learned to improve recovery practices and update the ROC Manual (City of Calgary, 2015e, h). As a result, CEMA updated the ROC Manual to a Corporate Recovery Plan that provided additional guidelines for operational processes focused on the ROC Administrative office and the FRTF (Interview 5). Since the flood, ROC was activated during the 2014 September

snowstorm -“snowtember”- that damaged half of Calgary’s tree canopy (Interview 7; Markusoff, 2014b). In this case, the ROC approach was different from the flood, but it was based on the ROC Manual and flood recovery recommendations (Interview 7).

This new “cross department collaborative culture” (Government of Alberta, 2015b, p. 21) is an approach that the CC was willing to pursue into the future (City of Calgary, 2014m, Government of Alberta, 2015b; Interview 2; Vroegop, 2015). Maintaining an interdepartmental approach was reflected in the BPBC4, where the City approved six full-time positions, under the City Manager’s Office, to build a corporate resilience framework (City of Calgary, 2015i; Vroegop, 2015), now the Resilience and Infrastructure Office. In late 2013, the City applied to be part of the Rockefeller Foundation, 100 Resilient Cities Network (City of Calgary, 2013c). The 100 Resilient Cities Network was created in 2013, and it began working with cities in December of the same year (100 Resilient Cities, n.d.). This is an opportunity that provides financial and expert resources to develop resilience measures to face the physical, social and economic challenges of an urban centre (*Ibid*). In May 2016, the City of Calgary became a member of the 100 Resilient Cities Network (City of Calgary, 2017c; Interview 7). As of March 2018, the Resilience and Infrastructure Office was working on their preliminary resilience assessment that describes the city’s profile regarding stresses and shocks (City of Calgary, 2018a; Interview 7). This effort will provide input for the BPBC 2019-2022 (City of Calgary, 2017c).

The flood also impacted directly and indirectly the business community; 4,000 businesses were affected by this event (Calgary Economic Development [CED], 2014; Calgary's core is open for business, 2013; City of Calgary, 2013d). Businesses recovery was directed by the Calgary Business Recovery Task Force (CBRTF) for over a year (CCC, 2014a; CED, 2014; Interviews 1; 4). This task force was co-chaired by Calgary

Economic Development (CED) and the Calgary Chamber of Commerce (CCC) (CCC, 2014a; Toneguzzi, 2013; Vroegop, 2015). It involved 16 organizations, which considered representatives of Calgary's Business Revitalization Zones (BRZ) (now Business Improvement Areas (BIA)), the City of Calgary, the Government of Alberta, Tourism Calgary, the Calgary Hotel Association, local universities among others (CCC, 2014a, Interviews 1; 4; Vroegop, 2015). The CBRTF created a recovery framework that considered three stages: Analyze, Mobilize and Energize (CCC, 2014a). The leading role of this task force was to advocate on behalf of businesses regarding funding, recovery information, advertisement and preparedness (CCC, 2014a; Interviews 1; 4). The product of their lobbying activity was the offering of bank loans at a low-interest rate, the organization of a business expo, the launch of a marketing campaign (YYC is OPEN) which invited consumers to support the flooded businesses, and in collaboration with CEMA, the creation of a preparedness handbook (*Ibid*).

Before I move on to the analysis, I have created a diagram that will help to keep track with abbreviations, stakeholders and programs involved in Calgary's recovery from the 2013 flood (Figure 4).

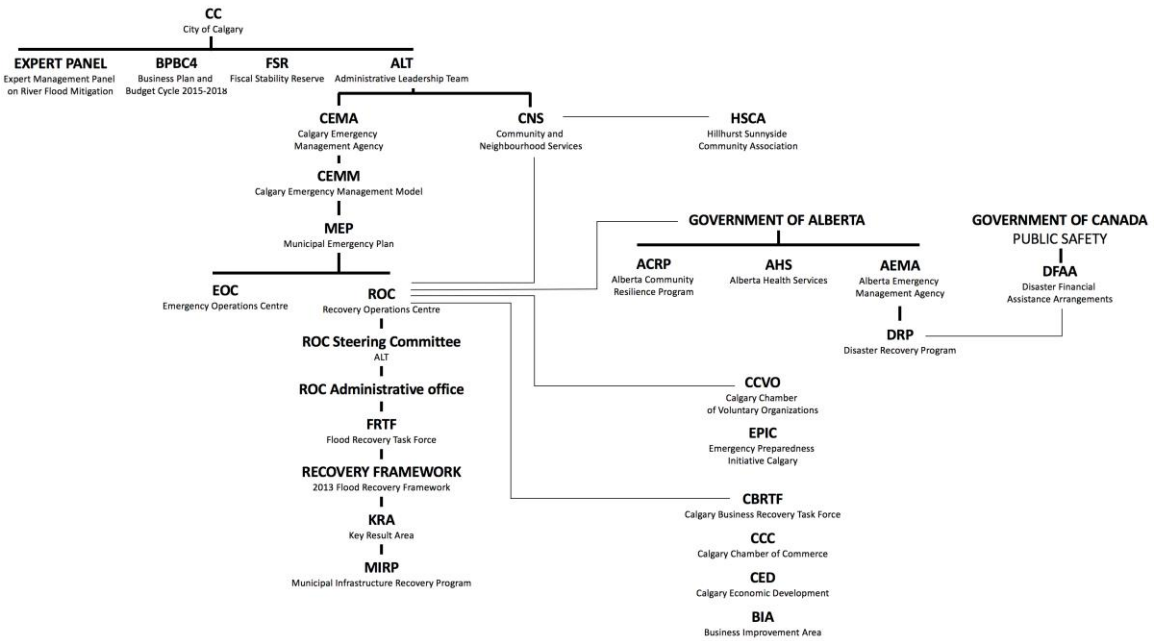

Figure 4: Abbreviations diagram
Source: Based on Chapter 5

Definitions of recovery, resilience and effective recovery

As discussed in the literature review, there are many definitions of recovery and the 2013 Southern Alberta flood was not the exception. The Government of Alberta defines recovery as returning as quickly as possible to normalcy, which is the pre-disaster state (Government of Alberta, 2013a, b; Markusoff, 2013a). This definition is echoed in the provincial Disaster Recovery Program, where "[f]inancial assistance is limited to the actual costs required to restore an item or facility to its pre- disaster functional condition" (Government of Alberta, 2013b, p. 16). In other words, this approach does not promote the improvement of physical structures but indicates that the reparation or repositioning of such structure should be as efficient as it was before.

As for a municipal definition, the ROC Manual and the recovery framework provided a description of short-term recovery that corresponds to the restoration phase of the NDRC (City of Calgary, 2013b; Interview 5). There is also a definition of long-term recovery which is "restoration, re-development, regeneration, rehabilitation, and improvement ("build back better" principle) of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors" (City of Calgary, 2013b, p. 9). The later phase, long-term recovery, relates to the recovery phase of the NDRC. City staff interviewees also defined recovery as "building back better" and building a more resilient community (HAZNET, 2017**;** Interviews, 2; 5; 7). A reflection of this is that even though the CC applied for insurance and provincial funding to recover infrastructure, improvements were funded through municipal budget items and their "rainy day" reserve, the Fiscal Stability Reserve (Interview 2). Another example is the municipal business continuity policy that the City launched in the 2014 Summer that was also developed with municipal capital (Interview 5). According to a CEMA interviewee, the municipal business continuity policy considered a significant number of resources

(Interview 5). The flood opened an opportunity to improve the CC's service delivery during business interruption (CEMA, 2014; 2015; Interview 5). According to the City, the purpose of guaranteeing business continuity during emergencies is that these services might be critical for recovery (Interview 5).

The Expert Management Panel on River Flood Mitigation (Expert Panel) defined resilience. The Expert Panel was an external committee that the City arranged to address flood mitigation issues (City of Calgary, 2014h). The Expert Panel proposed 27 recommendations to Council to reach flood resilience (City of Calgary, 2014a, h; 2016a). Then, the Expert Panel describes resilience as the capacity of a city or community to protect or prevent disruptive events and recover with minimal impact or adverse effects (City of Calgary, 2013c; 2014b, k). This definition describes the outcome of resilience which is the system's ability to respond to internal and external disturbances. The CC claims that it has built resilience in the past by building public awareness, emergency response investments and mitigation infrastructure (City of Calgary, 2013c). However, after the 2013 flood "that terminology of resilience really came into [their] vocabulary" (Interview 7). In early 2014, the CC created a plan to build resilience (City of Calgary, 2014b). Among the municipal actions to build resilience, there was the application to become a member of the 100 Resilient Cities Network, the creation of a corporate resilience framework, and the adaptation of municipal infrastructure to be resilient to flooding (City of Calgary, 2013c; Vroegop, 2015). Nowadays, the City is moving from building resilient infrastructure towards community resilience (Interview 7).

The recovery framework also proposed guidelines to what a successful recovery is as an outcome. For the FRTF, successful recovery considers performing community outreach, monitoring impacts and needs, building effective channels of communication, building individual, community, and organizational capacity (City of Calgary, 2013a).

Other municipal and non-municipal documents stated that the existence of a ROC, the creation of a recovery framework for reporting, having clear financial priorities were the gold standard to develop a successful recovery (City of Calgary, 2013d; Vroegop, 2015).

The Calgary flood response was considered as a successful approach by many sources from different sectors. For instance, The Conference Board of Canada evaluation of the CC recovery response states that this is a “great model for how municipalities should react to major disasters” (Kaliban, 2015, m. 00:20). In addition, participants from different sectors were asked if they considered the recovery to be successful and why. All of them replied it was a successful recovery and they attributed different reasons and actions. Most interviewees highlighted the importance of the existence of intergovernmental relationships (Interviews 1; 2; 5; 6; 7; 8). Another common response was how some municipal procedures were minimized to facilitate recovery (*Ibid*). Some participants noted that having a strong financial team was also key due to the number of recovery projects (Interviews 2; 7). When participants were asked what they would have done differently; municipal participants pointed out that considering public input in advance would have helped the social side of recovery (Interviews 5; 6; 7). Participants associate the “social side” of recovery as dealing with people’s post-traumatic stress and their constant requirements to improve the municipal response regarding preparedness (*Ibid*). Interviewees also stated that having a more detailed ROC Manual would have “eased” their tasks, even though it is impossible to pre-plan for all scenarios (Interviews 2; 5; 7). All of these factors are part of the analysis of this case study.

Preparing for recovery

Calgary’s emergency management has been coordinated since 2009 by CEMA (CEMA, 2014). The Agency’s mandate considers risk assessment, prevention,

mitigation, preparedness, and recovery while maintaining a collaborative response to natural and human-made disasters (CEMA, 2014). CEMA is a business unit and an agency. It is composed of appointed directors, senior managers from municipal business units and external stakeholders, which sum up to 60 different agency members and partners (City of Calgary, 2010a; Interview 5). Among those partners are utility providers, post-secondary institutions, provincial and federal agencies (*Ibid*).

The Comprehensive Emergency Management Model (CEMM) is the overarching guide for the municipal emergency response cycle (Figure 5) (CEMA, 2014; Interview 5).

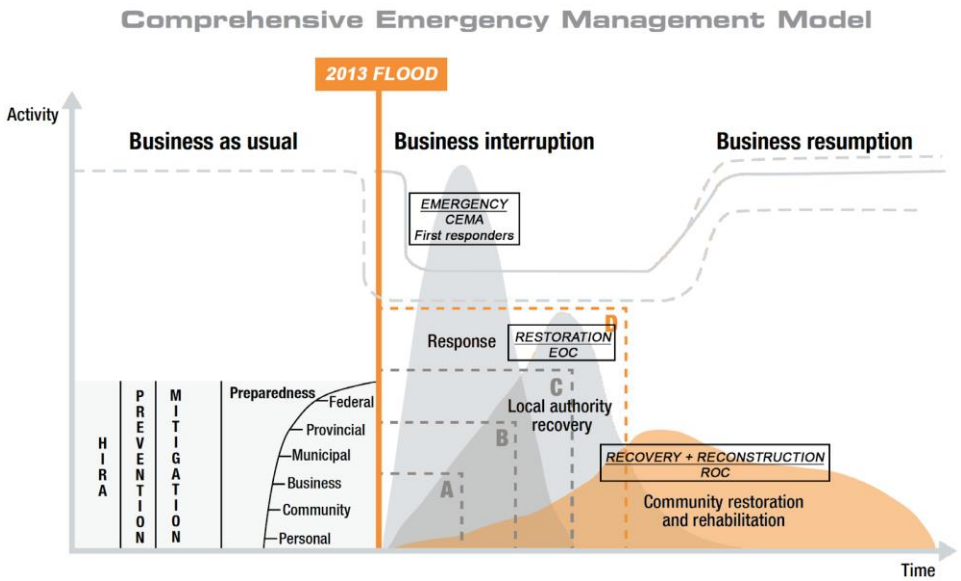

Figure 5: Comprehensive Emergency Management Model during the 2013 Flood

Source: Adapted from Calgary Emergency Management Agency (2014). 2013 Annual Report.

This is a cyclical and scalable model (Interviews 5; 7). It defines CEMA's permanent activities such as Hazard Identification and Risk Assessment (HIRA), prevention, mitigation and preparedness (CEMA, 2014). And then, it explains the activities that are pursued during the response cycle (CEMA, 2014; Interview 5), which considers Response, Local Authority Recovery, and Community Restoration and Rehabilitation. It is also a scalable model because a type "A" event could be managed

by First Responders, and a type D event will consider the declaration of a SOLE and the activation of the EOC and the ROC, which was the case of the 2013 flood (Interview 7). I will briefly describe each of the components of this model because it will help to compare it to the NDRC. (1) HIRA assesses hazards that could be a threat to public safety, infrastructure, the economy and the environment. (2) Prevention refers to measures that help to avoid damage related to any event. (3) Mitigation relates to “implement[ing] changes, based on lessons learned [..] derived from conducting training and exercises as well as response and recovery experiences.” (CEMA, 2014, p. 7) (4) Preparedness is about building capacity, developing plans, acquiring equipment and training the right people to respond during an emergency. (5) Response contemplates immediate actions with the purpose of saving lives, protecting properties and limiting damage to the environment and the economy. In the NDRC this phase would be Emergency. (6) Local Authority Recovery contemplates activities that aim to restore services and infrastructure. It relates to the restoration stage of the NDRC, and the EOC is responsible for coordinating these tasks. (7) Community Restoration and Rehabilitation is the sum of recovery and reconstruction actions from the NDRC. The affected stakeholders work together to limit losses and reduce suffering which also includes psychosocial and economic recovery. The ROC will expedite this phase; it may take place concurrent to Local Authority Recovery. Community Restoration and Rehabilitation considers four main areas of recovery. Social and community recovery involves taking care of issues that affect the community such as housing. Infrastructure and capital asset recovery is the physical reconstruction of public infrastructure such as utilities. Economic recovery focuses on supporting the restoration of businesses. And environmental recovery relates to major debris disposal from damaged assets (City of Calgary, 2010a; CEMA 2014; 2015).

Another activity that CEMA developed as part of their emergency response is the Municipal Emergency Plan (MEP). This plan is activated when the consequences of an event are outside the scope of normal operations (City of Calgary, 2010a). The declaration of a SOLE, and events that demand coordination of multiple agencies are some of the cases when the MEP is activated (*Ibid*). This plan documents the roles and responsibilities of all the involved stakeholders and organizes plan elements to guide prevention, mitigation, preparation, response and recovery strategies (*Ibid*). For instance, the MEP determines roles and actions for the EOC and the ROC (*Ibid*).

The ROC Manual[1] was a useful tool that CEMA prepared to guide the initial stages of recovery (Interviews 5; 7). The development of this manual occurred in 2010, and it was based on best practices and research that CEMA performed, as well as from previous experiences (Interviews 5; 7; Vroegop, 2015). As a previous experience, CEMA assisted in emergency and recovery response efforts during the Slave Lake fire in 2011, by request of the Government of Alberta (City of Calgary, 2012). According to City staff participants, the ROC Manual gave a starting point on how to begin recovery (Interviews 5; 7). The ROC Manual provided a template for the recovery framework. It considered the following Key Result Areas: people, infrastructure and funding, and governance (*Ibid*). Besides outlining the development of the recovery framework, the value of the manual was that it guided the ROC Steering Committee (Interviews 2; 5; 7). CEMA continuously trained ALT based on this manual. For instance, there were three training sessions before the 2013 flood (City of Calgary, 2015f; Government of Alberta, 2015b; Interview 7).

[1] This document is not publicly available. Due to security reasons, the CC does not provide detailed information on emergency response and recovery (Interview 5).

However, the ROC manual did not “reflect on what actually was needed” (Interview 5) because it only focused on preparing decision-making actors instead of supporting the ROC Administrative office and the FRTF (Interviews 2; 5). Participants pointed out that the manual was mostly theoretical and that it lacked the operationalization part of implementing recovery (Interviews 2; 5; 7). The purpose of compiling Lessons Learned was to improve future recovery practices (*Ibid*). Some of the Lessons were: strengthen relationships with the Government of Alberta by designating a central point of contact early on in recovery, enhance external partnerships to assist citizens, and commence early on with housing and property pillar programs (City of Calgary, 2015d, f). A product of this review was an update to the ROC Manual, which is now denominated Corporate Recovery Plan (Interview 5). This update considered “incorporat[ion of] recommendations, processes, tools, and networks that were identified during recovery from the flood” (City of Calgary, 2015h, p. 15). Some update examples are the development of a templates catalogue and recovery process maps, and the creation of ROC terms of reference (City of Calgary, 2015h; Interview 5).

Intergovernmental relationships

The Recovery Operation Centre compromises ROC Steering Committee, ROC Administrative office, and FRTF. The MEP describes the ROC as “the central hub where ALT manages and coordinates long-term community restoration and rehabilitation” (City of Calgary, 2010a, p. 14). The ROC considered a dedicated City staff team that provided leadership and resources to flood recovery activities (City of Calgary, 2014m; 2015d, f). The importance of the ROC Steering Committee was that it gave direction, assigned resources, and managed information (City of Calgary, 2010a; Vroegop, 2015). Coordination between decision-making and implementation was performed by the Recovery Director, who was assisted by an Administrative office. The Recovery Director

mandate was to ensure communication with external stakeholders (City of Calgary, 2010a; Government of Alberta, 2015b).

The ROC Administrative office was constituted by project managers from different business units (Government of Alberta, 2015b). This office was the central point of connection for coordination of projects, programs, and reporting based on the recovery framework deliverables (City of Calgary, 2015h; Interview 7; Jacobs, 2014). The ROC Administrative office was the direct liaison among “senior leaders, other orders of government, the insurance community, whoever [they] were working with” (Interview 7). Besides, the ROC Administrative office was responsible for coordinating all meetings including FRTF and ROC Steering Committee meetings, and provincial and non-profit gatherings (Personal e-mail, Feb 07). The Administrative office recorded and kept track of all recovery-related activities, such as minutes, agreements, and claims (*Ibid*). This overall coordination gave the ROC a “common operational picture for decision-makers” (Vroegop, 2015, p. 11) that provided a more efficient approach to avoid duplication of efforts, expedited the allocation of funds, and facilitated implementation (City of Calgary, 2015d).

The City, through CEMA, had existing relationships with external stakeholders related to Emergency Management (Interviews 2; 7). Having these relationships in place before the flood facilitated coordination and implementation of recovery activities. Provincial recovery coordinators were the direct liaison between the Province and the CC. This continuous relationship facilitated information sharing with the ROC Administrative office about new programs and also clarification of ongoing projects (City of Calgary, 2014l). As an example, the City was granted permits and the Flood Recovery Erosion Control fund to work on river banks in an accelerated way rather than going through the regular process due to those existing working relationships with the Province

(Interview 7). However, there were other instances where existing relationships with the provincial government were not enough to expedite infrastructure recovery (Interview 5). This relates directly to the Federal Disaster Financial Assistance Arrangement, which is a federal cost-sharing program with provincial governments (Government of Alberta, 2015a). City staff participants stated that this program does not fit the recovery reality concerning timelines and reporting activities, which placed an extra burden on City employees (Interviews 2; 5; 7). For instance, a CEMA interviewee declared that the provincial government requested that the CC fill out extra documentation to have access to funds that were needed to recover municipal infrastructure. This participant referred to this extra burden as follows: “It wasn’t a good situation […]. The provinc[ial government] actually increased our workload here, and it was actually a pain” (Interview 5).

Executive outreach meetings were gatherings between the City and the Government of Alberta (City of Calgary, 2015h). According to the CC, these meetings were “a method to build relationships and networks” (City of Calgary, 2015h, p. 15). These relationships were nurtured via in-person meetings, tours, briefing notes, conference calls, and email correspondence (City of Calgary, 2014g, l). The CC is aware that having strong vertical relationships is critical for effective recovery (City of Calgary, 2013c; 2014b). Therefore, among Municipal Lessons Learned is establishing terms of reference for executive outreach meetings in future emergency events (City of Calgary, 2015h).

Regarding horizontal relationships, the City of Calgary engaged with the non-profit sector and the business community (Interview 7). The relationship with the business community will be described and analyzed later on. The non-profit sector assisted Calgarians with their basic needs, such as rent support, or others that were not covered by the DRP or insurance (HSCA, 2013). For instance, a proof of the non-profit

sector support is reflected in the Canadian Red Cross work, which had not deployed so many resources since the World Wars (Ferguson, 2014a). Among the collected data, there is no clear sign of previous relationships with the whole non-profit community. Moreover, the Calgary Chamber of Voluntary Organizations (CCVO) stated that "[t]here is a clear need for better coordination and communication between nonprofits and government agencies during and after a crisis" (Calgary Chamber of Voluntary Organizations [CCVO], 2014a, p. 1). Nevertheless, the CC partnered with the Canadian Red Cross Society to assist with people's recovery through cost-sharing programs that waived municipals fees, like the Flood Permit Grant Program (City of Calgary, 2013d; 2014b; Interview 7). This program was envisioned to conclude by 2014, due to a lack of participation it was extended until the end of 2015 (City of Calgary, 2014l; 2015h). The CC acknowledges that this partnership was not successful, but it was considered an opportunity to direct residents to other sources of assistance (Interview 7; Vroegop, 2015).

As an effort to strengthen the non-profit relationship, the City convened a Community Resiliency Table in mid-2014, which was renamed in 2015 as the Emergency Preparedness Initiative Calgary (EPIC) (City of Calgary, 2014g; 2015h). This was a two-year partnership with the CCVO, the City's Community and Neighbourhood Services department, The United Way, The Calgary Foundation, and the Canadian Red Cross Society (City of Calgary, 2014l; 2015j; Vroegop, 2015). The goal of this initiative was to create a framework for disaster preparedness and recovery for social service organizations and neighbourhood associations (City of Calgary, 2014l). The purpose was to help non-governmental organizations place their own preparedness and business continuity plans to provide quality services to vulnerable populations during any disaster (CCVO, 2014b; City of Calgary, 2014l; Interview 5).

Recovery and bureaucracy

The outcome of intergovernmental relationships is the implementation of the recovery framework. Implementation was pursued by the FRTF (Government of Alberta, 2015b). The creation of the FRTF was when the ROC Steering Committee designated senior management team members to develop a project management approach to discuss recovery functions (City of Calgary, 2010a; Interview 5). These appointed City employees were either exclusively dedicated to recovery or developed recovery along with their day-to-day duties (Jacobs, 2014). The FRTF connected subject matter experts with different recovery related areas, which granted the Steering Committee direct communication with involved business units (Vroegop, 2015). The principal activities of the FTRF were: prioritize and complete infrastructure projects, keep track of these projects by collecting, storing and reporting data, and provide current information and regular updates (City of Calgary, 2014g, m). In addition, the FRTF monitored the achievement of objectives and deliverables of the recovery framework (City of Calgary, 2015d).

Implementation of the recovery framework considered the creation of appropriate procedures to respond to recovery efforts (Interview 7). Because the ROC Manual lacked the operationalization part of recovery, City staff participants stated that they had to “build the plane while [they] flew it” (Interviews 2; 5; 6; 7). Therefore, few institutional procedures were adapted to respond to recovery. Adaptations related to the recovery framework, recovery permit activities and procurement policies to accelerate the acquisition of resources during initial recovery (City of Calgary, 2013d; 2014d; Interview 7). Although there was no adaptation to procedures, there was a general agreement among all research participants that bureaucracy was minimized during flood recovery (Interviews 1; 2; 4; 5; 6; 7; 8). For instance, a ROC participant described that in order to

request a service from a different business unit, in “normal” times, City staff had “to write up a business case and […] do several steps in order to get that service”. However, because of the urgency of recovery “all the steps were minimized, I wouldn’t say eliminated, I would say minimized” (Interview 2). Official documentation and media reports also supported this phenomenon. The interdepartmental structure of the FRTF in addition to the urgency of recovery activities created an environment where “[t]here were no silos” (10 ways the flood changed city hall, 2014, par. 19); and challenges were approached with a solution based perspective (10 ways the flood changed city hall, 2014; Interviews 1; 2; 5; Vroegop, 2015).

Implementing the Recovery Framework

The objective of the 2013 Flood Recovery Framework was to “not only address the vitality of the built, economic, natural, and social environments but also reduce the risk of future disaster events in order to build a more disaster resilient community” (City of Calgary, 2013a, p. 10). Therefore, this could be considered as the vision statement of the framework. The structure that the recovery framework provided was essential to the communication of short and long-term goals to internal and external stakeholders (City of Calgary, 2013a; Vroegop, 2015). The recovery framework was also helpful for monitoring recovery activities by performing coordination, assessment, and tracking objectives and deliverables (City of Calgary, 2013a).

The formulation of the recovery framework was undertaken by directors of several business units who identified internal stakeholders who were consulted to provide input for objectives and deliverables (Government of Alberta, 2015b; Interview 7). Besides the input provided by experts, the recovery framework design considered the ROC Manual, CEMM, past disaster recovery experiences, academic research, and the review of models from around the world (e.g. Australia and British Columbia) (City of

Calgary, 2013a; Interview 7). The recovery framework was not integrated with policies or plans from other levels of government and local agencies (Interview 7). However, the recovery framework was a guideline for 2013 budget revisions and adjustments, and the BPBC4 (City of Calgary, 2013a). In addition, the recovery framework was aligned to overarching municipal policies such as MEP, Municipal Development Plan, and the recommendations of the Expert Panel (City of Calgary, 2013a, d; 2014h).

The City "did not undertake public consultation" (Interview 7) for the recovery framework formulation. A ROC interviewee stated that the CC was already aware of people's needs and that the recovery framework was sufficient to address those requirements (*Ibid*). In contrast, other City staff participants acknowledged that public participation was required for decision-making (Interviews 5; 6). They stated that those conversations should be taken in advance and that they are essential to learning about communities' priorities (*Ibid*). Moreover, these participants recognized that public consultation with flood-impacted communities was feasible because those neighbourhoods are already identifiable (*Ibid*). Public feedback was considered to shape and amend the recovery framework processes, objectives, and deliverables (City of Calgary, 2014g; Interview 7). The ROC collected people's feedback through one-directional communication forms such as direct individual service, door-knocking campaigns, information sessions, 311 phone calls and online (City of Calgary, 2014g; Personal e-mail, Feb 07). Hillhurst Sunnyside was an exceptional case because it was the only neighbourhood with a dedicated social worker that helped them to deal with recovery issues (Interview 6). Factors related to their recovery response will be discussed later on in this chapter.

Recovery deliverables were planned until the fourth quarter of 2014, which means that the recovery was projected to last 18 months (City of Calgary, 2013b).

However, during interviews City staff participants were asked what the projected recovery time frame was. Two interviewees stated that “at the very beginning […] it was anticipated a two-year mandate for the Task Force to stay together” (Interview 5). These participants declared that the timeline was projected and supported by previous academic research and past experiences (Interviews 5; 7). However, another interviewee stated that this projection was set “arbitrarily […] [they] just picked it and see where it goes” (Interview 2). Unfortunately, I was not granted access to the ROC Manual; therefore, I was unable to assess how the recovery time frame was established. This is the major contradiction found regarding data collection. The KRAs deliverables were either set quarterly or as on-going. According to a ROC interviewee, these goals were based on what the City wanted to see as recovery outcomes in three, six, and 12 months (Interview 7). Those outcomes would be reflected on “what do we want the newspapers to say about us June of 2014?” (*Ibid*). Therefore, milestones were visualized by the FRTF around that storyline (HAZNET, 2017). Recovery projects that were not completed by June 2015 were transferred to specific business units that were responsible for their implementation, tracking and reporting progress (City of Calgary, 2014m; 2015f).

The ROC regularly monitored the recovery framework deliverables. The FRTF reported quarterly to City Council and the Government of Alberta (City of Calgary, 2014g). These reports were denominated “2013 Flood Recovery Task Force Update Report”. Through these reports the FRTF gave an overview of recovering activities and responsibilities; reported on completion of the recovery framework deliverables by providing highlights of these tasks; stated community outreach means; and pointed funding requests to current and future operating and capital budgets (City of Calgary, 2013a, b; 2014b, c, g, k, l, m; 2015d, f). The FRTF also presented four progress updates

on the recovery framework deliverables (City of Calgary, 2014g, l, m; 2015f). These documents provided an update on all framework deliverables. The final brief related to the recovery framework was presented in June 2015 (City of Calgary, 2015f). This report was the transition plan that identified 11 remaining activities from the 2013 Flood Recovery Framework (*Ibid*). These pending deliverables were assigned to specific business unit leads (*Ibid*). Remaining recovery activities related to the reconstruction stage of the NDRC; and were taken over normal procedures in the BPBC 4 (City of Calgary, 2013a; 2015b).

The FRTF also monitored the Municipal Infrastructure Recovery Program (MIRP). This program coordinated the recovery of impacted municipal infrastructure, its financial estimates, and the required processes to claim funds from external sources (City of Calgary, 2014m; 2015f). The MIRP began in 2013 with 185 projects with assessed damages of $445 million, by 2015 there were 248 projects with an adjusted budget of $409 million (City of Calgary, 2015f). This variation relates to financial submission requirements for insurance companies and the DRP, which demanded the modification of projects into smaller initiatives (City of Calgary, 2015h). The FRTF prepared MIRP progress reports that monitored projects' status (City of Calgary, 2014l). These reports also provided an update on DRP and insurance claim submission (*Ibid*). The FRTF's final statement on MIRP and flood expenses was on June 2015 (City of Calgary, 2015f). As of June 2015, a 50% of the MIRP was complete, and remaining projects were expected to conclude by mid-2019 (*Ibid*).

Along with MIRP monitoring was Finance reporting. These statements provided information about recovery expenses that related to operations, capital, DRP, FSR and reimbursed funds (*Ibid*). Even though the ROC was aware of the enormous task that meant tracking and monitoring capital projects from the early stage of recovery, some

gaps needed attention (City of Calgary, 2014j; Interviews 2; 7). According to the Flood Recovery Expenditure Audit conducted by the City Auditor's Office, FRTF update reports did not present detailed information at the project level (*Ibid*). The City Auditor's Office claimed that proving detailed information to Council would increase understanding and transparency, and it will assist City Council in budget adjustment oversight (*Ibid*). One reason why the FRTF update reports did not provide such detailed information on a project by project basis might be that "[t]here [was] no mechanism in existing reporting processes to report on the budget [...]. Finance established manual processes to track this information" (City of Calgary, 2015g, p. 12). The City Auditor's Office recommended the implementation of a corporate project management framework for disaster events that should enhance accountability for project budgets and expenditures (City of Calgary, 2014j).

Funding recovery

Regarding seeking funding for Calgarians' recovery, the City of Calgary can provide financial aid to residents when it relates to municipal services, such as waiving fees for permits (Vroegop, 2015). Besides, the City assisted individuals by directing them to different sources of funding and aid (Interviews 2; 7). The CC sought internal and external funding to recover municipal infrastructure and operational costs from the 2013 flood response (Jacobs, 2014) (see Appendix B for estimated information). In early 2014, the City hired a consultant to provide technical advice to maximize funding from external sources (City of Calgary, 2013c; Jacobs, 2014). This document identified ten funding streams that the City could access (Jacobs, 2014). From those ten streams, the City applied to five sources in addition to the Alberta Resiliency Community Program (ARCP) which was launched by mid-2014 (City of Calgary, 2017a). In addition, the CC filed insurance claims of covered infrastructure (City of Calgary, 2013a; 2015d). Costs

that were not covered by insurance were submitted for DRP reimbursement (City of Calgary, 2013a; 2015d). Moreover, any shortfalls were expected to be covered by internal sources (*Ibid*).

The federal government, Public Safety Canada, provides financial aid to provincial and territorial governments through a cost-sharing program called Disaster Financial Assistance Arrangements (DFAA) (Government of Alberta, 2015a). Provinces and territories are the only ones eligible for DFAA; there is a formula that considers the Province's population which determines when the allocation of funds would apply (*Ibid*). The provincial government directs those funds (DFAA) to individuals, small businesses, non-profit organizations, municipalities and government departments through a Disaster Recovery Program (DRP) (Government of Alberta, 2015a). In the Province of Alberta, the DRP is administered by the Alberta Emergency Management Agency (AEMA) (*Ibid*). The DRP covers losses and damages for which insurance was not reasonably available at the time of the event (Government of Alberta, 2015a). The City co-hosted information sessions with the provincial government to guide citizens regarding DRP application (City of Calgary, 2014b; 2015c; Interviews 2; 6; 7; 8). Although citizens received information on how to apply to DRP, they described the process as extremely stressful and confusing (Interview 8; McClure, 2014; Vroegop, 2015).

The City of Calgary convened a Municipal Infrastructure Recovery/Disaster Recovery Program group during the emergency response phase, which allowed for the alignment of provincial and municipal activities regarding DRP requirements (City of Calgary, 2014e). This action ensured a high return rate from DRP, and it also allowed the CC to meet its internal reporting requirements (*Ibid*). The City submitted a DRP application early in the recovery stage, September 2013, and received a $63 million advance on the fourth quarter of 2013 (City of Calgary, 2013c). As of June 2018, the City

has received $120,110 from DRP infrastructure recovery applications, which were allocated gradually over the years (City of Calgary, 2014n; 2015k; 2016d; 2017a; 2018c). Remaining expenses are internally funded until the process is finalized (City of Calgary, 2018c). The DRP application and reimbursement are not completed, according to a ROC interviewee, the Province extended the application deadline for an extra year, 2019 (Interview 7). The City applied to two provincial grants that aid the operational side of recovery. One was the Municipal Staffing Capacity Grant (MSCG) that focused on assisting business units that required additional personnel during recovery (Vroegop, 2015). The other was the Flood Readiness Grant that funded operating costs that enabled affected communities to increase their resiliency (City of Calgary, 2017a). Both programs were completed and settled in 2016 (*Ibid*).

Another funding stream that the City applied for was the Property Tax Relief program. This grant eased the 2013-2015 property tax portion for property owners who lost the use of their real estate either permanently or for a prolonged period due to the flood (City of Calgary, 2015h; Vroegop, 2015). This program was available in August 2013 (Howell, 2014a); however, in July 2014 the City Council approved the application to cover those funds (City of Calgary, 2014m). The municipal delay in informing Calgarians about this program created confusion and disappointment within the population (Howell, 2014a). Nevertheless, this program aided about 700 property owners (Vroegop, 2015). As part of the recovery debriefing that the City conducted there was the recommendation to begin with the Property Tax Relief program earlier in the recovery phase (City of Calgary, 2015d). Another provincial program that assisted Calgarians was the Floodway Relocation Buyout Program. The Government of Alberta projected the removal of development in floodways by proposing homeowner buyouts for

relocation (Government of Alberta, 2015b). Finally, the Province reached 17 agreements with properties located within proximity of the Elbow River (City of Calgary, 2015f).

In mid-2014, the Province of Alberta launched the Alberta Community Resilience Program (ACRP), a three-year co-sharing grant directed to municipalities and First Nations to address long-term community resiliency regarding water management issues, such as flooding and drought (City of Calgary, 2014k; Government of Alberta, 2017). The municipality is in charge of the project's operation and maintenance costs (Government of Alberta, n.d.). The City has been granted funding for nine projects, among those projects are Sunnyside Pump Station #1 and #2 which will be discussed in the final section of this chapter (Government of Alberta, 2015c; 2016b; 2017).

Another external funding source was insurance. At the time of the flood, the City of Calgary had various insurance policies with different insurance companies that helped to fund a portion of infrastructure and content losses (City of Calgary, 2016d). The insurance policy does not cover claims that proposed building back better (Interview 2; Vroegop, 2015). Nevertheless, the CC's insurers agreed to incorporate changes as long as the cost of rebuilding did not exceed the pre-disaster condition value (*Ibid*). Moreover, when that was not the case, the City of Calgary supplemented the improvement costs (Interview 2). The estimated costs of damage covered by insurance were $166 million (City of Calgary, 2014l). However, according to the CC's annual reports (from 2013 to 2017), the City received $64,437 million with "the remainder being funded internally until further DRP claims are processed and finalized" (City of Calgary, 2016d, p. 86).

Insurance premiums increased significantly after the flood (City of Calgary, 2013e; 2014b, c). For instance, insurance premiums for municipal properties increased by $2.75 million in 2014 (City of Calgary, 2014g). FRTF update reports from late 2013

and early 2014 stated that insurance companies requested that the City provide information about measures that were implemented to reduce the likelihood of another major flood (City of Calgary, 2013e; 2014b, c; Vroegop, 2015). Later FRTF reports declared that "[i]nvesting in resiliency may assist in reducing insurance premiums and may help ensure coverage [that] may be obtained in future" (City of Calgary, 2014b, p. 10). The CC proceeded, through the ROC, by documenting infrastructure improvements and resiliency measures (Interview 2). In addition, the Administrative office provided tours of recovered infrastructure, to prove to insurance companies that the City was moving forward into preventing damage from a future event (*Ibid*).

Regarding insurance for private properties, the 2013 Flood Recovery Framework did not consider advocating to insurance providers to aid affected residents (Interview 7). At the time of the 2013 event, overland flood damage was not covered by home insurance policies (Insurance Bureau of Canada, 2017). However, most insured homeowners were covered for sewer backup (McClure, 2013b). Calgarians struggled with flood-related claims because "they fe[lt there were] inconsistencies in how property insurers [were] handling [claims]" (McClure, 2013b, par. 1). In the end, some insurance holders were covered by sewer backup, but their new policy stated that there was coverage for sewer backup but not in the context of a flood (Interview 8). Also, their premiums doubled and even tripled because of the 2013 flood (*Ibid*).

Municipal internal funding sources were the Fiscal Stability Reserve (FSR) and the Tax Room. The City of Calgary holds different reserves that are used "to meet specific future operating and capital expenditure requirements and to provide for emergencies" (City of Calgary, 2014n, p. 48). Since 2013, the FSR is the largest municipal reserve, accounting for $357.3 million in 2013 ($493 million in 2017) (City of Calgary, 2014n; 2016e; 2018c). Since 2005 this reserve has been used to fund

operational emergencies, contingency capital expenditures, and one-time operating budget expenditures (*Ibid*). In November 2013, City Council approved the allocation of $100,000 million to fund flood recovery projects (City of Calgary, 2015l). The assignment of these resources allowed the City to bridge funding gaps, such as infrastructure improvements not covered by insurance (Interview 2), and co-sharing costs of ACRP (City of Calgary, 2015d).

The so-called provincial Tax Room also funded flood recovery. The Tax Room occurs when the provincial "share of property tax [is] lower than the City expected" (City of Calgary, 2018d, par. 9). That surplus of tax revenue is unbudgeted municipal funds that are commonly denominated Tax Room. In 2013, there was a surplus of $52 million due to a reduction in the education provincial budget portion of the property tax (Cuthbertson, 2013). Early in 2013, City Council requested feedback on where Calgarians wanted those funds to be directed (Markusoff, 2013b). According to media reports, more than one-third of polled residents backed the "give it back" option (Markusoff, 2013c; Playing finders keepers, 2013). However, in July 2013 City Council approved the allocation of the Tax Room to flood relief and recovery expenses (City of Calgary, 2013c). Calgarians proposed to use the FSR or increase taxes for the next period to cover those costs (Markusoff, 2013c; Playing finders keepers, 2013). Calgary's Mayor, Naheed Nenshi, stated that he would instead use those available funds for a specific purpose rather than increase taxes on unknown future expenses (Nenshi, 2013).

Helping Calgarians in their recovery

The City of Calgary, led by the ROC, monitored and supported the recovery of citizens and municipal employees (City of Calgary, 2013a). Calgarians were reached through several channels. The local government engaged with residents through traditional and social media, door-knocking campaigns, public presentations,

correspondence with Council members, via telephone, direct individual service, online (calgary.ca), and information sessions (City of Calgary, 2013d; 2014g; 2015b; HAZNET, 2017; Interviews 2; 7). The CC also engaged with affected communities, principally with Hillhurst Sunnyside (HSCA), through an on-site social worker, that towards the end of the recovery was able to work with other communities (Interview 6).

According to FRTF update reports and interviews, information sessions were a significant means of communication that the City used, besides its online presence. The CC intensely hosted and co-hosted information sessions at the early stages of recovery in late 2013 and mid-2014 (Interview 7). These sessions were used as a way to connect directly affected residents to social services providers, such as the Alberta Health Services (AHS) (*Ibid*). The Expert Panel also attended those meetings to inform Calgarians about the progress of the program and to request residents' input (City of Calgary, 2014a). In March 2014, "[t]he City launched a flood specific Service Request [...] which offer[ed] a direct port of entry by the public to the ROC office" (City of Calgary, 2014b, p. 9). Even though the CC opened an instance for citizens to present their concerns directly to the ROC, this initiative was not successful. According to the Conference Board of Canada report, one concern of the ROC performance was their "capacity to recognize and monitor those vulnerable parts of the population who lacked the ability to request assistance through regular channels" (Vroegop, 2015, p. 39). For instance, the HSCA became aware of the existence of the ROC in August 2014 when they learned about ACRP (HSCA, 2014g). Besides, the City built a strong web presence. This action helped citizens to be informed on recovery and also connected them to resource needs (City of Calgary, 2015h). This presence became stronger leading up to the one-year anniversary of the flood (City of Calgary, 2014m).

Previous to the flood, CEMA conducted community education and awareness activities (Interview 5). However, after the 2013 event, the City implemented more preparedness plans that were focused on all types of community groups and demographics (*Ibid*). The purpose of these programs is to prepare the community and their leaders on what to expect in an emergency, how they can learn about CEMA's operations and how they can partner (*Ibid*).

Flood readiness is a program that targets a wide range of residents which was launched in early 2014 (City of Calgary, 2014i; 2016a). This is a communication plan that provides permanent information on how to prepare for flooding (*Ibid*). Later on, in the Spring of 2015, the City introduced a community disaster preparedness program, Ready Calgary (CEMA, 2015; City of Calgary, 2015h). This is a plan that uses a train-the-trainer approach, where for instance, a community leader is trained by an institution, and then that person trains their own community (Interview 5). The main purpose of this plan is to empower communities and build resilience (City of Calgary, 2015b, h; Interview 5). Currently, CEMA is updating Ready Calgary; the focus now is to implement a tracking system on how communities are engaging with this program, instead of contacting the community only at the training session (Interview 5). After the flood, CEMA included the small business community in their education stream (*Ibid*). A shared initiative of CED, the CCC and CEMA developed a business continuity plan handbook to enhance the preparedness of small businesses in order to prepare these organizations to respond to disasters (City of Calgary, 2014k; Interview 5)

Participants agreed that the "people" side is the most challenging aspect of recovery. The ROC, through the municipal business unit Community and Neighbourhood Services (CNS), monitored the psychosocial recovery and resilience of affected citizens (City of Calgary, 2014m; 2015f). In addition, the City promoted commemoration events

of the one-year anniversary of the flood to help Calgarians manage their anxiety around the wet season (City of Calgary, 2014l; 2015h; Interviews 6; 7; 8). Citizens were worried about another flood happening again and about suffering the physical and emotional loss one more time (*Ibid*). One of those events was the announcement by the Calgary Mayor to declare the Saturday closest to the flood anniversary as “Neighbour Day”. The purpose of this initiative is to annually celebrate Calgary’s volunteer spirit demonstrated during the flood (Ferguson, 2014b; Sylvester, 2015). Communities celebrated by hosting barbecues, street cleanups, block parties and sports events (Ferguson, 2014b). Neighbour Day is an annual activity that has gone beyond the flood-anniversary. Communities still celebrate this day through block parties, sports events, and yard sales, like the one that the HSCA celebrated in June 2017 (Swerve, 2017). There was also a commemorative display at City Hall that reminds “Calgarians of an important time in the city's history” (Ferguson, 2014b, par. 4) (Figure 6).

Figure 6: Commemorative display, City Hall, City of Calgary
Source: Picture from Interview 7.

Recovery from the 2013 flood required specialized staff (Vroegop, 2015). The City appointed skilled municipal staff with emergency management or related background to perform recovery (Interview 2; Vroegop, 2015). The MSCG assisted municipal business units that required additional help by funding those new positions (Vroegop, 2015). Nevertheless, this grant only covered a net new hire. In other words, if the ROC wanted to transfer a City employee with a specific skill set, MSCG did not cover that relocation. In that case, MSCG would reimburse the backfill position of the transferred employee (*Ibid*). However, the lengthy recruitment process "led some business units to forego hiring externally" (Vroegop, 2015, p. 31). The shortcoming of this issue was that some positions were not backfilled, which meant that City employees would be running recovery on the side while performing their own duties *(Ibid).* Another issue was that City employees who were removed from their normal activities were left in the dark after recovery was "done" (*Ibid*). Their future was uncertain; if their previous positions were backfilled, there was not a clear policy about what would happen to them (*Ibid*). A measure that the CC developed to address this issue was based on a recommendation from the Conference Board of Canada. It suggested the implementation of an Employee Skills Inventory to improve the ability to match immediate and long-term requirements with available staff (Interview 5; Vroegop, 2015).

The City was aware that employees' wellness was crucial to develop recovery (City of Calgary, 2013c). A ROC interviewee described recovery as a task that it is "hard work and it is relentless, it doesn't stop" (Interview 7). Various municipal staff were exposed to stressful situations that were out of the scope and training of their regular jobs (Vroegop, 2015). Recovery was also described as an emotional process for

everyone including City employees (HAZNET, 2017). The CC's Human Resources Department monitored staff wellbeing and engagement to make sure that employees were supported during recovery efforts (City of Calgary, 2014g). In May 2014, ALT approved Human Resources policies during activation of the MEP (*Ibid*). These new policies aim to support the deployment of human resources during emergencies and recovery; the purpose is to maintain the staff's health and productivity (*Ibid*).

Recovery of the business community

The effect of the flood on the business community relates to overland flooding, sewage backup, freshwater flooding, and loss of power (Calgary's core is open for business, 2013; CED, 2014; Interview 4). Besides the damage that the flood might have had on businesses, some small businesses lost inventory and customers due to lack of electricity and road closures (CCC, 2014a; Interview 4; Legge, 2013). According to the Calgary Chamber of Commerce (CCC), recovery "is not done until the businesses are open" (Interview 1). The Chamber states that, according to the Strategic Research Institute, 43% of companies that experienced a natural disaster will never recover (Legge, 2013). Nevertheless, only 1% of Calgary's businesses were forced to close after the 2013 flood (Interview 4; Jason, 2014). Even though there were no recovery plans or funding sources in place to respond to this event; interviewees from the business community declared that recovery efforts were successful (CCC, 2014a; Interviews 1; 4). Participants attributed success to the Calgary Business Recovery Task Force (CBRTF) approach.

The CBRTF came together for the first time to respond to the 2013 event (Vroegop, 2015). This initiative came into place when the Chief of CEMA asked the CCC to take care of the business community because the local government was "too busy dealing with the residential and the humanitarian side" of recovery (Interview 1). The

primary objective of this task force was to provide a multi-organizational response so businesses could operate as fast as possible (CCC, 2014a). To fulfill this objective, the CBRTF advocated on behalf of small and medium-sized businesses, encouraged community members to support the flood-affected businesses, and promoted Calgary's commerce locally and nationally (CCC, 2014a; CED, 2014).

The CBRTF supported the business community for over a year (Interviews 1; 4). This task force met weekly for the first six months and then once a month until its closure (*Ibid*). The CBRTF created a three-part framework (analyze, mobilize, and energize) for the recovery of the 2013 flood (Interview 1). Now it is embedded within CEMA protocols, and it was adopted by the World Chamber Federation as the global protocol to respond to emergencies (*Ibid*).

Regarding the businesses' recovery framework, the CBRTF definition of recovery was explained by a chamber interviewee as returning to normalcy (Interview 1). The "analyze" part of the framework relates to collecting information to understand what were the community's needs (CCC, 2014a; Interviews 1; 4). That information was used for advocacy purposes; this is the "mobilize" part of the framework (CCC, 2014a; Interviews 1; 4). The CBRTF approached banks and asked for loan and interest forgiveness (Interview 4). The task force also reached the provincial government to extend the tax submission deadline (taxes were due a week after the flood) (Interview 1). Another request to the Province was to expand DRP funding for small businesses. The Government of Alberta extended DRP funding, but businesses were already recovered when this program was launched (*Ibid*). According to the Chamber, advocating for funding was the hardest part to achieve (*Ibid*). The task force also mobilized recovery information to affected companies. The CBRTF arranged portable information kiosks that were set up in affected areas (CCC, 2014a; Interview 1; Toneguzzi, 2013). Business

owners could ask questions to municipal staff, AHS, banks, insurers, utility companies among others (*Ibid*). A month after the flood, the CBRTF organized a business recovery expo (CCC, 2014a; CED, 2014; Interview 1). The Expo provided all the information that business owners needed in one place (CCC, 2014a)

The “energize” part of the framework considered advertising campaigns that stimulated Calgary's economy. The purpose was to inform Calgarians and Canadians that Calgary was “open for business” again (CCC, 2014a; CED 2014; Interview 1). The “YYC is Open” campaign was launched in mid-July 2013 (CED, 2014). The CED collected funding from Tourism Calgary, the Government of Alberta, a local bank, and other partners that supported a $1.4 million marketing campaign (CCC, 2014a; How Calgarians saved flooded businesses, 2014). In parallel, a group of caring Calgarians created *yycisopen.com*, a digital media campaign that encouraged people to support flood-affected areas (*Ibid*). In a short time, this campaign gained popularity, and the CED contacted *yycisopen.com* representatives, so this volunteer campaign could be taken over by the experts on the field, CED (CCC, 2014a; Interview 1). Calgary’s Mayor was the campaign’s spokesperson; this action gave a sense of urgency about the importance of supporting affected businesses (Interviews 4; 7) (Figure 7).

Figure 7: YYC is Open marketing campaign of Kensington BIA
Source: Picture from Interview 4

According to the Chamber, the local and provincial government "often needed to be reminded about the needs of businesses" (CCC, 2014a, p. 6). A business community participant stated that this phrase points to the issue that businesses were not considered in any of the recovery plans or frameworks (Interview 1). Although it is true that MEP stipulates that the ROC mandate is to manage social, physical, environmental, and economic recovery (City of Calgary, 2010a). The FRTF did not monitor the business community recovery; update reports mentioned businesses only two times – December 2013 and June 2014 (City of Calgary, 2013d; 2014g). However, according to interviewees, the CC was very responsive and supportive of the CBRTF needs and requirements (Interviews 1; 4). Moreover, they described the City's response as a non-bureaucratic approach that showed that the City understood how people's livelihood could be affected by business failure (Interview 1). A ROC participant declared that the City has learned how valuable the business community recovery is to support Calgary's

economic growth (Interview 7). However, it was not clear if businesses would be part of the framework or if the ROC would partner with a future CBRTF.

A step that showed the City's commitment to the business community was the implementation of a preparedness handbook developed by CEMA in partnership with CCC and CED (City of Calgary, 2014l; Interview 5; Vroegop, 2015). After the flood, the Chamber learned that businesses "were very unprepared for an emergency" (Interview 1). The "Is your business prepared?" handbook was launched on the one-year flood anniversary and replicates information and recommendations from the Business Recovery Expo (CCC, 2014a). The purpose of this handbook was to increase awareness and build a more resilient Calgary (CCC, 2014a; Interview 1).

How Hillhurst Sunnyside faced recovery

Hillhurst Sunnyside's location has caused its neighbours several flooding episodes (HSCA, 1978). The location and the soil conditions are the most significant threats to this neighbourhood (*Ibid*). According to the municipal water department, on an interview provided before the flood, earth banks along the Bow River were high enough to protect Sunnyside from a 1:100 year flood (McClure, 2013b). In June 2013, around 400 houses were impacted by overland flooding, sewer backup, and seepage[2] (HSCA, 2016b; Interviews 3; 8; McClure, 2014). The Kensington BIA is the commercial area of this neighbourhood and has around 270 businesses, most of them small. Freshwater flooding and electricity disruption impacted nearly all of them for nine days (Interview 4; Patterson, 2013).

[2] Seepage occurs when "porous soils become super saturated with water that has migrated underground from swollen rivers" (McClure, 2013b, par. 11)

Besides its location, Hillhurst Sunnyside has another particularity that increases flooding. I will briefly explain this condition. Hillhurst Sunnyside stormwater collection system is below the level of the river; and this system also collects stormwater from the upper plateau which are neighbourhoods located up in the mountains, like Banff Trail (HSCA 2016b; Interview 3). When the river is high, there were manually operated outfall gates that closed to prevent backflow from the river into the community (*Ibid*). Those gates must be open when the river is at a lower flow rate (*Ibid*). Those gates are operated by the Water Services Department of the City of Calgary (HSCA, 2016a; Interviews 6; 8). On July 5th, two weeks after the flood, there was a heavy rainfall that overwhelmed the neighbourhood's stormwater system because the Bow River was flowing at twice its regular rate, and the outfall gates were partially closed when they should have been opened (Gignac & Fraser, 2013; HSCA 2016b, Interviews 3; 8; McClure, 2014). According to media reports, overwhelmed City crew members were unable to open those gates (Gignac & Fraser, 2013; McClure, 2014). However, a neighbour opened them manually (Interview 8). The second flood, caused by this heavy rainfall and compounded by the backflow, caused even more damage than the first one. Some people already had cleaned their houses and were rebuilding when water came into their basements again (Interviews 6; 8).

In June 2013, as an emergency response, the Hillhurst Sunnyside community members hosted a collection center that was born when neighbours found themselves with fridges full of food and with no electricity; so they started to feed volunteers and redirect help to affected residents (Hunt, 2014; Interview 8). This impromptu organization was called Crisis Cafe (HSCA, 2016a; Interview 8). It ended up being an information hub that supported and coordinated help to community members from different organizations (*Ibid*). The recovery phase was undertaken by the Community Association (HSCA,

2014a). The Hillhurst Sunnyside Community Association (HSCA) was described as a powerful, engaged and loud association within Calgary (Interviews 4; 5; 6; 8).

After the flood, the HSCA arranged a flood task force to channel help to residents in need (HSCA, 2014a; Interview 8). This task force had three divisions that related to damage assessment, technical assistance and advocacy (HSCA, 2014a). The flood task force conducted a survey to assess impact, which was filled by 319 households (HSCA, 2014a; Interview 8). The collected information helped the community association “to ensure that the needs of Hillhurst Sunnyside residents recovering from the 2013 Flood are known and being met” (HSCA, n.d.a, par. 5). Different governmental institutions and NGOs collaborated with the HSCA. Among those organizations were non-profit organizations, utility companies, the City of Calgary's Water Services Department, and the Government of Alberta (HSCA, 2013; 2014c, f; Interviews 6; 8).

The HSCA received a grant from a non-profit organization that was used to cover expenses of administering the survey and also to create emergency preparedness plans (HSCA, 2014f; Interview 8). The Community Leaders Program was a preparedness program that trained volunteers from each block so every neighbour could receive help during an emergency from the block leader (*Ibid*). The Community Association also worked on an emergency management plan. This plan was envisioned to be very specific to the neighbourhood’s needs (HSCA, 2016a; Interview 8). In addition, the HSCA also purchased a private emergency warning system to alert every resident when an emergency occurs (Interview 8). Most of the association's reports state that the purpose of these activities aimed to build a more resilient community (HSCA, 2014a, f). However, one participant declared that resilience was only a “buzzword” they used to apply for funding (Interview 8). Unfortunately, all of these efforts lasted for no more than a couple of years due to a lack of funding and community engagement (*Ibid*).

The first and second flood left emotional scars on Hillhurst Sunnyside residents. The flood task force also worked to help the healing of its community. Although there was no loss of life, residents lost important belongings (Interview 8). According to an HSCA participant, “some people are still having nightmares” (*Ibid*). A number of residents get anxious around the wet season, some of them are still re-living the trauma (Two years later, 2015). The HSCA celebrated the one-year anniversary of the flood with a volunteer appreciation party on the Crisis Cafe location (Ferguson, 2014b; HSCA, 2014f). At that location, the flood task force, in collaboration with a local artist, built a commemoration bench (HSCA, 2014f; Interviews 6; 8) (Figure 8). Furthermore, the association partnered with Trickster Theatre Company, a Calgary-based company, which worked with Sunnyside School students to help them with their traumatic experience from the flood (HSCA, 2014f McClure, 2014). “Rising Above: Sunnyside and the Flood of 2013” was presented on the weekend of the one-year anniversary and had Calgary's Mayor presence (HSCA, 2014f; Interviews 6; 8).

Figure 8: Crisis Cafe Commemorative Bench, Hillhurst Sunnyside
Source: Picture from Site Visit March 1st, 2018

Community and Neighbourhood Services (CNS) assigned the social worker that assisted on a full-time basis in the recovery of Hillhurst Sunnyside residents alone out of all of the impacted neighbourhoods (Interview 6). Field support began early after the flood until mid-2015 (Interviews 6; 8). This person approached their new position without a clear role (Interview 6). Moreover, the recovery framework was not a useful tool for this employee (*Ibid*). In the beginning, the social worker did what they thought was best for the community by using a community development strategy. This employee created their role, which was described as part advocacy, part liaison, and relationship building (*Ibid*).

This employee assisted the HSCA flood task force with their survey; acted as a liaison with CEMA regarding the development of the community's preparedness and emergency management programs; and acted as a liaison and advocate to the municipal Water Service Department (Interviews 6; 8). The HSCA emergency preparedness plan's development was described as a stress response that the social worker had to balance with municipal procedures and be cautious not to halt the association's activities that were also part of their healing process (Interview 6). The City gave the social worker "freedom and flexibility to be able to not just to make decisions but to do what needed to be done to support the neighbourhood" (Interview 6). The social worker lauded this approach because it helped to address HCSA actual needs (*Ibid*). Towards the end of municipal recovery efforts, this City employee started to hear more about the needs of the other eight impacted neighbourhoods – Beltline, Bowness, Elbow Park, Erlton, Inglewood, Mission, Rideau Park, and Roxboro (City of Calgary, 2013a, e; Interview 6). Therefore, this person asked their superior to reach out to them

and provide similar resources. However, CNS did not have enough resources to cover field work on a full-time basis (*Ibid*).

In addition, there were municipal door-knocking campaigns requested by Hillhurst Sunnyside (City of Calgary, 2013d). The City was not the only organization knocking on doors. The Red Cross, the Government of Alberta, and the HSCA flood task force were conducting door-knocking campaigns (HSCA, 2013; Interviews 6; 8). Residents were overwhelmed with the amount of door-knocking which ended up making them feel frustrated (*Ibid*). Additionally, there were at least three information sessions held in Hillhurst Sunnyside (HSCA, 2014a, f). These sessions were supported by the City of Calgary, the Government of Alberta, and on occasions by other organizations (City of Calgary, 2014a; HSCA, 2014a, f). According to HSCA participants, these sessions were useful to community members because they helped them to solve insurance, construction and application issues (Interviews 3; 6).

In early 2014, the Expert Panel began working on measures to prevent flooding in Sunnyside (City of Calgary, 2014a). The Expert Panel implemented the retrofit of outfall gates to allow remote operation, and an evaluation of the stormwater drainage system (City of Calgary, 2013e; 2014a). In addition, as part of their recovery efforts, the task force advocated for the following mitigation measures, which should be implemented in the reconstruction phase of the NDRC. As of March 2018, these mitigation measures were not yet implemented (Interviews 3; 8):

- The refurbishment of a sanitary lift station (City of Calgary, 2016b; Interview 3).
- The refurbishment of a stormwater pump station (#2) that was damaged during the flood and caused fresh-water flooding on Kensington BIA (Interviews 3; 4; Patterson, 2013).

- The construction of a new pump station (#1) that has been funded by three levels of government (Jarvie, 2016; Interview 3).
- The diversion of the upper plateau stormwater collection system (Interview 3).

The HSCA flood task force advocates actively to the City and the Province (HSCA, 2015; Interview 3). The Community Association's strategy is to advocate through letters, personal meetings, and phone calls (Interview 3). According to HSCA interviewees, their lobbying has had a positive effect regarding the formulation and implementation of mitigation measures to prevent another major flood in Hillhurst Sunnyside (Interviews 3; 8). Both participants stated that, even though the CC has not developed all of their requests, they believe that the City has heard their interests, and they, as a community, feel supported (*Ibid*). The HSCA would not stop advocating until the neighbourhood's stormwater system is improved so "the next time there is a flood, [they] will stand and watch the water get high and not worry about it because it won't affect [them]" (Interview 3).

Chapter 6. Discussion and Conclusions

In this final chapter of my thesis, I will compare the empirical evidence of the Calgary case study with the conceptual framework.

Discussion

Definition of recovery and disaster resilience

In response to the 2013 Southern Alberta flood, the definition of recovery and resilience defined the respective institutional approach. The Government of Alberta defined recovery as returning to normalcy. Therefore, its funding program reimbursed reconstruction of infrastructure to its pre-disaster condition. On the one hand, the City's definition of recovery was to "build back better" which was reflected in the structural and non-structural measures that the City funded to build flood resilience. On the other hand, the CC's resilience definition does not declare how the city would recover. Is it by returning to (new) equilibrium? Alternatively, is it by adapting and transforming Calgary's urban systems in response to the flood? There is no clear answer. Therefore, I believe that the municipal description of recovery ("build back better") complements the CC's definition of resilience (capacity to protect or prevent disruptive events and recover with minimal impact or adverse effects). In my opinion, the City's definition of resilience is closer to socio-ecological resilience. Because the City of Calgary implemented its recovery by pursuing different levels of improvements to the affected macro areas – the physical, social and economic systems. Regarding resilience building, the creation of the 100 Resilient Cities Network, the flood event, and the City's application to this network took place in the same year – 2013. Therefore, it is difficult to assess if the existence of 100 Resilient Cities Network influenced the municipal recovery efforts.

Recovery outcomes

The work that the City of Calgary performed to achieve recovery from the 2013 flood is summarized in Table 3. Regarding recovery outcomes, the CC addressed the recovery of the physical and social macro-areas. The economic macro area was developed by the business community. As for physical recovery, the City not only proposed a mitigation plan, the Expert Panel recommendations and MIRP, but also created a business continuity policy and land use amendments that would improve the physical response of future disasters. The creation of the Expert Panel helped to propose mitigation actions to be implemented in the reconstruction stage of the NDRC. These actions, specifically in Hillhurst Sunnyside, help to reduce flooding risk to Calgarians and Calgary's infrastructure.

The social macro area of the conceptual framework has two sides. First, the promotion of knowledge. The City expanded its education streams after the flood to "gear" its residents with the right tools to face another disaster. By ensuring that residents and organizations, such as non-profit organizations and businesses, are aware of how to act and react to an event might help them to minimize losses and therefore reduce the amount of recovery efforts.

The other side of social recovery is the promotion of networks. The municipal effort to communicate with its community through different one-directional communication modes is an attempt to keep Calgarians up-to-date on recovery progress. The approach of the City of Calgary lacks a multi-way and even a two-way pathway of communication for decision-making. If the CC wants to achieve its vision "to build a more disaster resilient community" (City of Calgary, 2013a, p. 10), it needs to build governance capacity that can be accomplished through the collaborative planning approach. Therefore, in response to a future disaster, the CC must begin to work in

advance with diverse players, like HSCA, CCC, the Canadian Red Cross, and the business community, for the elaboration and implementation of the recovery framework. The City should also assist technically and financially disadvantaged stakeholders, such as HSCA, for them have informed input. These diverse actors must be involved in a multiway communication method, like face-to-face meetings. This way, stakeholders would learn about their interdependency and each other's interests. The purpose is to build relationships that will help create networks. These networks would build trust and empathy. In turn, affected and relevant stakeholders might be willing to adjust their behaviour to benefit the vision and community's wellbeing, which would be developing a disaster resilient community.

The collaborative planning approach is the ideal method to achieve and resolve complex issues. However, I wonder how this approach fits and can be applied in the fast-paced and information-poor environment of natural disaster recovery. This an area in need of further research. However, my hope is that the collaborative planning approach would be part of the pre-planning piece of recovery so when a natural disaster strikes the urban system, the city of Calgary, has the governance capacity to respond effectively to the disruption.

If the municipal approach is to reach affected communities by assigning on-site social workers instead of public participation, the City needs to expand this strategy. In my opinion, one staff in the field it is not enough to understand the needs of the most vulnerable populations. Assigning a full-time social worker to Hillhurst Sunnyside was an adequate approach to understanding the neighbourhood's recovery needs. The double flooding that Hillhurst Sunnyside experienced was addressed with the presence of the social worker. In my opinion, the City of Calgary assigned the social worker to "amend" or "compensate" the damaged caused by the failure of controlling the outfall gates. My

argument is that the social worker did not have a defined role to play, it seems that it was not considered in the 2013 Flood Recovery Framework. In addition, my perception from HSCA interviewees (Interviews 3; 8) is backed up by the description of the social worker, when they say that Hillhurst Sunnyside residents “definitely had some anger and frustration” in relation to the second flood (Interview 6). The role of the social worker of advocacy and liaison can be translated into trust building. The presence of this employee helped to clarify that “[the City was not] doing anything to intentionally hurt the community” (Interview 6).

The municipal approach to address the mishandling of the outfall gates can be categorized as what Carayannopoulos and McConnell (2018) call “policy placebo”. They refer to this term when authorities “address some of the symptoms” (p. 359) instead of tackling the issue at hand. In the Calgary case, this could be reflected in the appointment of the social worker to guide Hillhurst Sunnyside recovery showing that the City was trying to solve the problem instead of building resilience in this community. A future line of research would be once the response to the 2013 flood is over, this is when the reconstruction phase of the NDRC concludes, one can assess if the municipal approach was to benefit the affected population or to “enhanc[e] government or leaders’ reputation/electoral prospects at the expense of programs” (McConnell, 2010, p. 358).

So, I wonder, since there was no clarity about the role of the social worker, was their purpose to focus on building a relationship between the community and the City which could be translated into an avoidance of work to raise awareness about the complexity of the situation of Hillhurst Sunnyside? Or alternatively, was the social worker the channel that helped the HSCA to recover and transform so they could adapt during future disturbances?

On the other side, HSCA played an active role during recovery. HSCA not only directed assistance to needed residents but also supported the healing of their community. The volunteer appreciation party had a significant impact on Hillhurst Sunnyside neighbours. There are still some signs of the party in the neighbourhood (Figure 9). Another critical role that HSCA flood task force played was advocacy. Advocating to different levels of government helped them to pursue their objectives. From the nine ACRP projects granted to the City, two are improvement projects for Sunnyside infrastructure (Pump station #1 and #2) (Government of Alberta, 2015c; 2016; 2017).

Figure 9: Hillhurst Sunnyside Appreciation Party Signs Placed on Front Yards
Source: Pictures from Site Visit March 1st, 2018

Table 3: City of Calgary Flood Recovery Efforts

RECOVERY OUTCOMES

Macro area	Objective	Indicator	Responsible	City of Calgary Recovery Efforts
Physical	Protection of human life and assets	Mitigation plan	Recovery Framework	Business continuity policy, MIRP, Land-use amendments, Property relocation program
Social	Promotion of knowledge and networks among affected and relevant stakeholders	Building governance capacity	Recovery Framework	Information sessions, online, social worker, Neighbour Day, EPIC, Ready Calgary, Property tax relief, Flood permit grant, Employee skill inventory, HR policy for MEP
Economic	Supporting local economy	Assisting local businesses	CBRTF	Advocacy, Business recovery expo, kiosks, YYC is Open, Business continuity handbook

RECOVERY PROCESSES

Macro area	Objective	Indicator	Responsible	City of Calgary Recovery Efforts
Planning compressed in time	Pre-planning	Creation of NDRC and local enhancement plans	CEMA	CEMM, MEP, ROC Manual
	Intergovernmental relationships	Previous channels of communication	CEMA - CC	Collaboration with GoA, AHS, Non-profits
	Compression of bureaucracy	Adaptation/improvisation procedures	CEMA - ROC	Adaptation recovery framework and procurement procedures, Improvisation (non-bureaucratic processes)
	Massive funding	Claiming for public funds and insurance	PROVINCE - CC	External (DRP, MSCG, ACRP, Insurance). Internal (FSR, Tax room)
Implementation recovery plan	Vision statement	Vision	CEMA - ROC	Objective, definition of recovery and resilience. KRAs
		Integration with other municipal policies	ROC	Alignment with other municipal policies
		Short/long-term goals	Recovery Framework	Quarterly deliverables. Transition plan.
	Dedicated task force	Interdisciplinary task force	ROC	Interdepartmental flood recovery task force
		Monitoring	FRTF	Update reports, collection, tracking, storing and reporting of KRA, MIRP and finance

Source: Own elaboration, based on Chapters 3 and 5.

Defining who – affected and relevant stakeholders – should be involved to achieve an effective recovery is a task that requires further research. Nevertheless, I venture to say that in the Calgary case study, specifically Hillhurst Sunnyside, affected stakeholders would be everyone that was impacted by the flood. These are individuals that are linked to the neighbourhood through residence, labour, studies or recreation (Kensington BIA, Sunnyside School students, faith organizations, and sports associations). As for relevant stakeholders, I propose that relevant refers to everyone that has a legitimate interest. That could be either by expertise or resources to address recovery such as non-profit organizations and the local government. In addition to everyone that is interested in the issue, such as taxpayers.

Economic recovery was not addressed through municipal efforts. The approach of the CBRTF was not only successful regarding recovery of the economic system, but it is a clear example of building governance capacity. Although the local government did not plan this approach, it proved to be an effective multiway dialogue strategy. A critical factor was the inclusion of a diverse range of stakeholders in the CBRTF. The CBRTF promoted interaction among business-related organizations, an interaction that did not exist before the flood (Interview 4). The task force was able to support the affected businesses' subsistence, and as a consequence people's livelihoods, by lobbying with banks to provide adequate funding. The CBRTF not only relied on public funds but also was able to create a strategic alliance with non-profit and for-profit organizations that supported the business recovery. The CBRTF also focused on stimulating the local economy in a time of need. The YYC is Open campaign was successful. As a result, tourism registered a 4.8% hike in visitors in 2013, which was above the national average (How Calgarians saved flooded businesses, 2014).

In sum, the role of the CBRTF was to help businesses with their physical – the venue and inventory – restoration and to bring back customers to support the impacted companies. The assistance of this task force was not based on asking for public funds to aid businesses. The focus was, on the one hand, to direct another kind of financial support to impacted companies, such as interest forgiveness (Interviews 1; 4). On the other hand, the CBRTF assisted businesses by directing customers to impacted neighbourhoods in order to provide longer-term support to struggling companies. Alternatively, I ask myself, what would have happened to small businesses and their interdependent systems if the CBRTF would not have stepped up? Noting the importance of economic recovery for impacted communities, the City of Calgary recognized it must involve the business community in their future response as an outcome and in their decision-making process (Interview 7).

Even though the purpose of the CBRTF was to help small- and medium-sized businesses to recover from this disaster, this task force strategy could be considered as a bouncing back approach. The CBRTF definition of recovery as returning to normalcy was reflected in the task force's efforts to get businesses open as quickly as possible. This proves that the business community was trying to reach equilibrium instead of creating strategies that would help the business community to adapt and transform in the face of future disruptions.

Recovery processes

The City of Calgary, through CEMA, developed a disaster response plan, which is considered as a step in the right direction towards an effective recovery. The CEMM proposes that the response cycle begins entirely after the disruption but with different activity intensity and time extension, which was the case in 2013. In contrast, the Natural Disaster Response Cycle (NDRC) states that these phases overlap. The NDRC

captures the sequence of natural disaster response because decision-making during each phase will affect the outcome of the next stage. For instance, if during the emergency, First Responders can protect lives and assets, when restoration takes place, the EOC will have fewer activities to coordinate. Therefore, the ROC will have to manage social, physical, economic and environmental recovery at a lower scale because the city was prepared and protected by previous work done. On the other side, CEMM's "business as usual" activities (HIRA, prevention, mitigation and preparedness) that are the beginning of the cycle, could also be considered as a result of the natural disaster response. In the Calgary case, most of these activities (mitigation and preparedness) were projected in recovery to be implemented in reconstruction and beyond. Therefore, I propose to represent the "wave chart" as an actual cycle diagram (Figure 10), where all of these efforts aim to build resilience as a constant process rather than an outcome. Why did I leave aside mitigation and preparedness from the cycle? Because I agree with RAND's (2011) statement that resilience includes the whole community when preparedness and mitigation are approaches are led and implemented by governmental institutions.

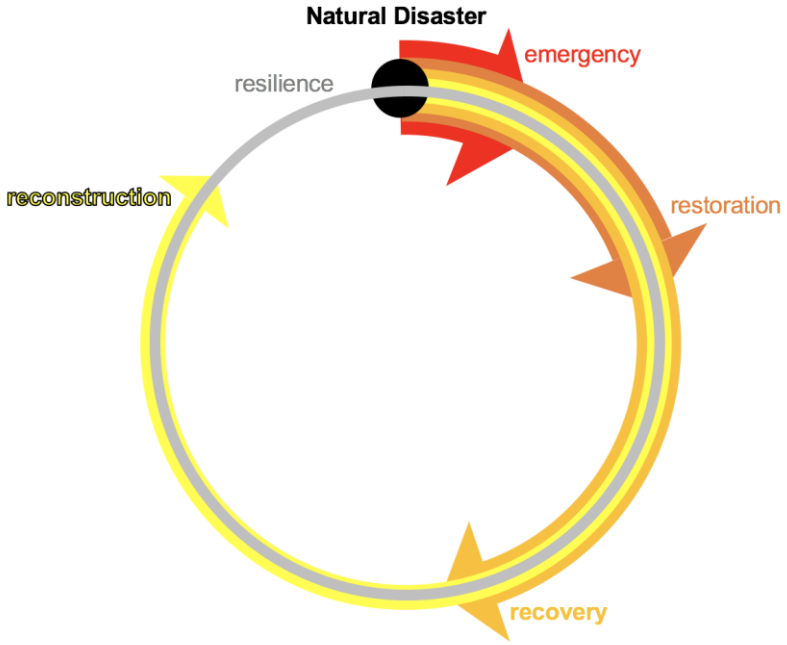

Figure 10: Revised Natural Disaster Response Cycle Diagram
Source: Based on Rubin (2009). Long Term Recovery from Disasters; Calgary Emergency Management Agency (2014). 2013 Annual Report.

CEMA was able to pre-plan for the recovery process by designating an exclusive team to lead the recovery – the ROC and the FRTF. This is what I call the recovery "environment" because the ROC was able to focus on planning and implementing recovery instead of trying to figure out what their role was, and to whom they have to talk. For instance, the CEMM determined how the City would prepare and respond to different types of events. Through the MEP, CEMA established who was responsible for each stage of the CEMM. Finally, the ROC Manual provided structure and guidance on how to begin with recovery. The Corporate Recovery Plan, the update of the ROC Manual, also moves forward to respond effectively to future disasters, with a defined operationalization of recovery efforts.

If the CC wants to respond effectively to future disasters, it needs to engage with hazard-prone neighbourhoods, like Hillhurst Sunnyside, and work on local enhancement

development alternatives. In this respect, the CC has room for improvement, because before the flood, the CC did not have in place “long-term community development priorities” for neighbourhoods exposed to hazards (Interview 5). However, the local authority is aware that it needs to engage with these communities, especially the ones that are impacted by floods because these neighbourhoods are already identified as vulnerable (Interviews 5; 7). These local enhancement development alternatives must be addressed through a multiway communication method such as the collaborative planning approach to ensure a successful outcome.

Another challenge that the City of Calgary and the Province of Alberta face is that there might be “new” hazard-prone areas that have not been identified due to shifting climate and risk areas caused and exacerbated by anthropogenic climate change. Moreover, according to Johnsrude (2014), “Alberta Environment and Sustainable Resource Development’s flood maps don’t do enough to reflect climate change” (p. 32). The 2013 Southern Alberta Flood caught the province with out-of-date flood maps (*Ibid*). The explanation of out-dated flood maps might be due to the reduction of federal funds for the Alberta-Canada Flood Hazard Identification Program, which ceased in 1992. (*Ibid*). Therefore, the update of hazard-prone areas is an issue that must be addressed by higher levels of governments.

Regarding intergovernmental relationships, the City of Calgary comprehends that vertical integration is vital during recovery, which is another sign of the effectiveness of recovery planning. Existing relationships and channels of communication with other levels of government enabled the City to perform a more efficient recovery regarding funding and development of recovery activities. For instance, the DRP return rate as of 2015 was 99% (City of Calgary, 2015h). However, concerning horizontal integration, to achieve an even more successful recovery the City of Calgary needs to visit more

opportunities to expand collaboration among local agencies and NGOs to fulfill the needs of impacted vulnerable populations and related sectors.

The adaptation of procedures on recovery relates to the 2013 Flood Recovery Framework adaptation from the ROC Manual, and permit and procurement procedures. There was no adaptation of existing policies or programs to respond to the framework's KRA. Interviewees pointed out several times that this was an unprecedented event (Interviews 2; 5; 6; 7). Their expression of "building the plane while you fly it" reflects their concern about how to deal with recovery. Therefore, recovery required a lot of creativity to create or improvise new procedures to respond to this unprecedented disaster (Interview 7). Nevertheless, the City took advantage of the opportunity window by compressing institutional performance when needed and allowed. A general appreciation from research participants was that the CC understood the urgency of recovery. Sometimes development in compressed time might not require the adaptation of institutional procedures because there might not be adequate ones in place. Instead, the opportunity window is leveraged by putting aside agendas, minimizing steps and focusing on recovering. With this in mind, I would say that the CC approach to responding to the complexity of recovery through a more flexible path is not only a sign of effective recovery response but also moves to build resilience by adapting to the circumstances and transforming their regular institutional procedures to face disruptions.

Recovery from natural disasters requires the allocation of massive funding. The City of Calgary was not only able to access massive funding, but also that capital came from several different sources which is a right step towards effective recovery. However, the City must pursue building a resilient community so recovery could be done autonomously. So, I ask myself, what would happen if another event takes place and there are no external funds available to recover? On that line, the FSR is a municipal

measure that could help the City to recovery effectively when there are fewer external sources. About the Tax Room issue, instead of spending those surplus tax funds in flood relief, City Council could have relied on the FRS and listened to citizens' requests about giving back those unbudgeted funds. Alternatively, the recovery framework proposed "building a more resilient community" (City of Calgary, 2013a, p. 10). The word resilience or resiliency became more frequent in the FRTF update reports after the City's insurance premiums were increased. So, I wonder if "resiliency" is a concept that was used to fulfill the insurers' expectations about Calgary's recovery. In addition, if building resilience helps the City to access affordable insurance, I hope that those efforts also help residents to access affordable flood insurance. Municipal efforts to build a stronger relationship with insurance companies might help or push the insurance industry and higher levels of government to find a way to provide affordable insurance for individuals as well.

A new theme that came up through this research regarding natural disaster recovery is the Human Resources side of it. Collected data revealed the fragility of the individuals in charge of the 2013 flood recovery. This fragility relates to the amount of work that some City employees had to develop with little training, in addition is the stress that some staff had to deal with during recovery. This also proves that City employees must show a degree of personal resilience to face recovery. According to ROC participants, recovery created an emotional toll on them. The recovery of a city also depends on the skills and well-being of the people leading and performing recovery efforts. Therefore, the Human Resources policies that the City launched are a positive component of achieving an effective recovery.

Calgary's recovery was led by an interdepartmental task force that was a dedicated team focused on recovery activities. Unfortunately, this task force did not

include diverse actors from external organizations which might have affected the development of the recovery framework in terms of expertise and experience. Moreover, the 2013 Flood Recovery Framework did not consider public participation for its formulation. However, according to an interviewee, only 15% of Calgary's area was flooded (Interview 7). So, if it those communities are already known and they comprise a small proportion of the city, why not begin with a multiway dialogue strategy that involves affected and relevant stakeholders and avoid, for example, the failure of the Flood Permit Grant Program? This way the recovery framework's vision statement would align with the communities' actual needs. Additionally, the recovery plan was not integrated with other municipal policies. In other words, the recovery framework was not part of a greater comprehensive plan. The lack of integration to major municipal programs might have affected the implementation of the recovery. The framework provided milestones that facilitated monitoring and tracking of recovery activities, which contributed to transparency regarding the status of recovery efforts about proposed goals and future challenges. That gave the ROC a sense of control over the recovery activity. City staff participants mentioned the importance of "staff[ing] up your funding team 110%" (Interview 7). Nevertheless, there are still gaps to fill regarding finance monitoring.

It would not be fair to state that recovery planning and implementation developed by the City of Calgary was inefficient. However, for future disruptions, if the purpose is to perform an effective recovery, the CC needs to address these issues. Through this case study, I am able to understand that recovery is achieved not only by municipal efforts but also through partnerships among different levels of government, private organizations, either non-profit or for-profit institutions and the consideration of the input provided by ordinary people.

Conclusion

Studying the municipal response to the 2013 Southern Alberta flood in the City of Calgary provided insight about effective recovery from natural disasters. This research project provided an understanding of the natural disaster response cycle (NDRC), and in fact an opportunity to argue for its revision (Figure 1 and Figure 10). It helped to expand the meaning of the operational definition of recovery, which is directly related to socio-ecological resilience – adapting and transforming in response to disruptions.

This thesis project also explored the knowledge of effective recovery. The analyzed bodies of literature provided a normative stance of effective recovery that was partially reflected in the City of Calgary response. Regarding recovery outcomes, there is room for improvement in the social and economic macro areas. As it was stated by Berke and Campanella (2006), stand-alone recovery plans, like Calgary's recovery framework, set aside crucial factors of recovery. In the Calgary case, there is a lack of efforts to build governance capacity. Another issue is the slight municipal assistance towards the business community. However, if I move from an institutional perspective to a governance perspective, leaving aside the social macro area, Calgary's recovery response was effective. The most valuable action that was pursued was the collaborative approach used by CBRTF which was supported by the City. This is a clear example that an effective recovery is developed by the involved stakeholders. Therefore, as a conclusion of this research, an effective recovery involves actions that are developed altogether by the affected and relevant stakeholders, not only by the local government. This phenomenon helps to build the capacity of the governance system, and as it was stated in the literature review, a governance system with capacity is resilient.

Regarding recovery processes, the City of Calgary had the right components to lead an effective recovery. Planning compressed in time was approached efficiently except for the lack of the local enhancement plans proposed by Inam (2005) and the weak horizontal relationships that were addressed later on in recovery. In terms of the implementation of recovery efforts, the City could review Schwab (1998) guidelines on recovery planning. There is the need to address the incorporation of the recovery framework into a comprehensive municipal policy. In addition to the appointment of an interdisciplinary instead of an interdepartmental task force.

Overall, I would define the Calgary case study as a case where the local government had in place the right processes to develop an effective recovery. However, the City requires guidance on what a recovery plan should address – the first layer of the conceptual framework. The City of Calgary must improve its public participation approach in order to understand the needs of the most vulnerable communities, like inner-city neighbourhoods in hazard-prone areas – Hillhurst Sunnyside. Also, the CC must play an active role in the recovery of the business community to support the economic recovery of Calgary.

Hillhurst Sunnyside is a case of advocacy. The components of this case are HSCA's motivation and the trust-building role that the social worker played. The HSCA flood task force's recovery approach for the neighbourhood and its residents is a constant action. The HSCA presented their concerns not only to the local government but also to the provincial government and non-profit organizations. The social worker was the visible face of the City that helped to channel HSCA concerns and provide a viable solution. The HSCA recovery model of dealing with and leading the whole process by themselves can present certain limitations that are worth researching. The motivation of the community members of Hillhurst Sunnyside to develop a preparedness

program to assist their own neighbours' needs to meet at some point with a more structured approach whereby residents can be aware of the complexity of dealing with a recovery process and how their reality fits with that of the whole city. For instance, the fact that city staff were overwhelmed with the flood response which caused the second flood in Hillhurst Sunnyside, could have been avoided if citizens were trained to act in that kind of situation. So, what is worth further research is the question of how best to balance the community self-reliance versus the municipal-led approach to recovery.

Finally, this project was directed to planners and scholars when implementing recovery. Its purpose was to provide appropriate insight about effective tools that can help to develop a successful recovery. The closing contribution of this thesis are the Lessons Learned about leading recovery from an institutional approach in the city of Calgary.

Lessons Learned

Definitions

- Resilience is the guiding thread of the NDRC. Disaster resilience is a constant process that is present in the different phases of the post-disaster response and involves the whole community.
- The definition of recovery will define the institution's approach.
- A definition of recovery as "bouncing forward" would improve the approach of the affected community to respond to disturbances. In addition, the institution would be willing to cover the costs to improve their approach to respond to future natural disasters.
- Recovery should not only address the needs of physical systems to be resilient but also should create social and economic recovery strategies.

Recovery outcomes

- Protection and improvement of municipal infrastructure are critical for protecting other systems. Delivery of services during interruptions can also improve the effectiveness of recovery.

- Recovery must consider public participation from the early stages of the disaster. Municipal employees also must be prepared for recovery regarding training and their well-being.
- Engaged neighbourhood associations are crucial for healing communities and requesting adequate measures to be prepared for the next event.
- Supporting the business community will increase the city's recovery.

Recovery processes

- Pre-planning for recovery is crucial to focus efforts on the implementation of recovery instead of trying to solve planning issues.
- Intergovernmental relationships will support effective recovery.
- Adaptation of existing procedure might not help on recovery delivery. An effective municipal approach is to minimize steps.
- The allocation of funds from internal and external sources can help to recover and build resilience. Moreover, the goal should be to build resilience so the institutions can face recovery autonomously.
- A recovery plan with a clear structure and parameters should facilitate the development of deliverables and their monitoring.
- Overall, recovery is not a 100% the responsibility of the local government. An effective recovery would be developed by all of the affected and relevant stakeholders.

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Appendices

Appendix A Recommendations for the City of Burnaby

A future research stream would be the development of a detailed recovery model. An example would be the development of a recovery plan for the City of Burnaby that could help that municipality implement recovery after a natural disaster. Implementation of this plan must consider a – socio-ecological – resilience model, in addition to a collaborative planning approach, to build a resilient community through governance capacity.

Overview

Fortunately, the city of Burnaby has not experienced recent natural disasters. In terms of human-induced hazards, this city is exposed to oil spills and leaks, which would affect its residents and the environment (City of Burnaby, n.d.a). On the other side, the Province of British Columbia is exposed to earthquakes and resulting tsunamis; and the Lower Mainland is at greater risk of flood damage than any other location in all of Canada (Stevens & Hanschka, 2014). Burnaby is exposed on the north by sea level rise and on the south by the north arm of the Fraser River.

The City of Burnaby has not experienced any natural disaster since the flood that affected the Lower Mainland in 1948, where “nearly one third of the entire lower Fraser Valley floodplain area, had been flooded” (Environment and Climate Change Canada, 2010, par. 21). Even though the Lower Mainland has not experienced a great flood in almost 70 years, it does not mean that it would not happen again. Moreover, the municipalities that lie on Fraser River delta soil are at greater “risk of catastrophic loss from a major flood” (Yumagulova & Vertinsky 2017, p. 277) due to the location of their large population and essential regional, provincial and national infrastructure (*Ibid*).

Regarding emergency response, the City of Burnaby established in 1998 the "Burnaby Major Emergency Response Plan[3]" (City of Burnaby, 1998; 2003). This plan addresses a "general direction and framework covering prevention, preparedness, response and recovery measures" (City of Burnaby, 2003, p. 1). This plan is developed and updated by an Emergency Planning Coordinator that City Council appoints. The Emergency Planning Coordinator and their assistant form the Emergency Management Office (EMO) of the City of Burnaby (Interview 9). This office "through the City's normal budgeting process, annually submit[s] estimated costs for the maintenance and operation of the City of Burnaby Emergency Plan" (City of Burnaby, 2003, p. 2). In case of a disruption, an Emergency Management Committee comprised of the Mayor, the City Manager, the Emergency Management Coordinator and other municipal units along with Fraser Health Authority Representative, coordinates and directs the implementation of the Emergency Response Plan (*Ibid*). The Emergency Management Coordinator is the primary coordinator of this committee (*Ibid*). When there is the declaration of a SOLE, the Emergency Management Coordination is the liaison between the City of Burnaby and the Government of British Columbia (*Ibid*).

The disaster response cycle, according to EMO, consists of mitigation and prevention, preparedness, response, and recovery (City of Burnaby, n.d.b). Since "Burnaby Major Emergency Response Plan" is not publicly available, I asked for a copy of it, but I was not granted access. Therefore, I am unable to compare this response cycle with the Natural Disaster Response Cycle (NDRC). The only reference that I was granted was that the City of Burnaby definition of recovery is based on BC Emergency Services (Interview 9). The Government of British Columbia defines recovery as the

[3] This document is not publicly available

fourth pillar of emergency management and “focuses on actions to restore a community to as close to pre-disaster state as possible” (Government of British Columbia, 2011, p. 7). Nevertheless, the City of Burnaby participant commented that recovery relates to “building back better” and considers strategies like business continuity and community recovery (Interview 9).

Regarding recovery planning, the City of Burnaby has not prepared a recovery framework or plan (Interview 9). According to the City of Burnaby participant, in case of a disaster, this local government would “borrow” recovery plans implemented by other institutions, like the City of Calgary, the City of Toronto and Washington State in the U.S. (*Ibid*). Recovery efforts would be directed by the Emergency Management Coordinator, and it would include the creation of a task force that considers staff from several business units like Planning, Fire, Building and Engineering (*Ibid*). The City of Burnaby would respond to recovery in collaboration with the regional, provincial and federal government representatives; and in addition to non-profit organizations, along with the merchant association, utility companies, and post-secondary institutions among others (*Ibid*). This participant declared that there are no agreements in place, but there are existing relationships with these organizations (*Ibid*). The City of Burnaby would adapt its existing procedures and programs to address recovery (*Ibid*). In terms of funding, the City would apply to provincial recovery funds (*Ibid*). The City of Burnaby does not have a reserve fund to address recovery but, according to the participant, the City is in a good place because it is debt-free (*Ibid*).

Recommendations

(1) The very first recommendation would be to increase the number of full-time positions of the EMO because there are many actions that the City of Burnaby needs to develop to ensure adequate planning for an effective recovery.

(2) Based on the proposed conceptual framework, recovery processes, the City of Burnaby needs to pre-plan for the whole NDRC. It should work on its own definition of disaster response and recovery, so it can direct the institution's efforts. The recommendation is to define recovery as "bouncing forward", so Burnaby could be better prepared to face future disruptions. Besides pre-planning for the NDRC, the City must begin to work with hazard-prone neighbourhoods, such as the neighbourhoods located in the Fraser River floodplain, to work on community development priorities that can be addressed when the opportunity window opens.

(3) The development of these plans must consider public participation through a multiway dialogue strategy that acknowledges the interdependency of a diverse set of stakeholders, which should include and assist disadvantaged players. A multiway communication method would promote constant learning and innovation that in turn have the potential to create a self-organizing urban system that is capable of adapting and transforming in the face of disruptions. Unfortunately, I am unable to provide more details on successful public participation because this was not achieved in the Calgary case study.

(4) The recovery plan should consider the recovery of physical/environmental, social and economic urban systems to ensure an effective recovery. Particular attention should be given to the recovery of the social and economic macro areas. The recovery plan should also provide opportunities to create a mitigation strategy to be implemented during reconstruction. This mitigation plan would complement the current flooding mitigation efforts that the City has implemented (the construction of dykes on the floodplain of the Fraser River and the implementation of supplementary zoning (City of Burnaby, 2012; 2017)). The plan must consider a vision that provides a desired outcome to be achieved after recovery; the designation of an interdisciplinary planning task force

that not only considers representatives from municipal business units, but also the stakeholders listed by the City of Burnaby interviewee; the creation of short- and long-term goals that aim to achieve the vision statement; and the creation of a monitoring strategy to assess the implementation of the recovery plan.

(5) In terms of effective recovery processes. The City must strengthen the existing intergovernmental relationships through efficient channels of communication. Once the NDRC plan is in place, the City must consider which procedures and programs it might adapt to take advantage of the opportunity window. Nevertheless, the City also needs to be willing to compress or improvise procedures, like Calgary's approach. Finally, the City of Burnaby could consider the creation of a reserve fund, like Calgary's Fiscal Stability Reserve, which will help to implement an effective recovery.

If the City of Burnaby implements the proposed recommendations in collaboration with potentially affected and relevant stakeholders, Burnaby would be in the right track to achieve an effective recovery.

Appendix B Estimated Recovery Funding and Expenditures 2013 – 2017 ($'000s)

FUNDING STREAM	2013	2014	2015	2016	2017	TOTAL	
DRP infrastructure	$63,033	$277	$16,800	$40,000	$-	**$120,110**	deadline 2019
INSURANCE	$50,000	$437	$14,000	$-	$-	**$64,437**	settled in 2015
FSR	$100,000	$-	$-	$-	$-	**$100,000**	one time allocation
TAX ROOM	$52,000	$-	$-	$-	$-	**$52,000**	one time allocation
MSCG	$-	$4,930	$-	$-	$-	**$4,930**	settled in 2016
FREC	$12,645	$39,460	$-	$-	$-	**$52,105**	settled in 2016
FLOOD READINESS	$-	$7,685	$-	$-	$-	**$7,685**	settled in 2016
PROPERTY TAX RELIEF	$-	$2,094	$326	$-	$-	**$2,420**	settled in 2016
TOTAL	**$277,678**	**$54,883**	**$31,126**	**$40,000**	**$82**	**$403,687**	

Non-recovery funding streams	2013	2014	2015	2016	2017	TOTAL	
DRP emergency	$-	$32,372	$1,295	$5,604	$82	**$39,353**	deadline 2019
ACRP	$-	$-	$13,090,000	$12,832,380	$12,851,078	**$38,773,458**	

BUDGETED	$445,147	---	$409,647	---	---	
EXPENDITURES	**2013**	**2014**	**2015**	**2016**	**2017**	**TOTAL**
OPERATING	$43,614	$6,247	$-	$-	$-	**$49,861**
CAPITAL	$32,248	$41,139	$14,550	$12,659	$7,294	**$107,890**
INSURANCE CAPITAL	$68,932	$32,353	$9,108	$1,442	$-	**$111,835**
INSURANCE OPERATING	$3,670	$-	$-	$-	$-	**$3,670**
MSCG	$-	$2,909	$1,026	$259	$-	**$4,194**
FREC	$-	$18,717	$11,607	$8,913	$3,212	**$42,449**
FLOOD READINESS	$-	$4,257	$3,550	$-	$-	**$7,807**
PROPERTY TAX RELIEF	$-	$2,094	$326	$-	$-	**$2,420**
PERMIT PILOT PROGRAM	$-	$310	$50	$-	$-	**$360**
RESILIENCY	$-	$1,110	$35,264	$24,544	$-	**$60,918**
TOTAL	**$148,464**	**$109,136**	**$75,481**	**$47,817**	**$10,506**	**$391,404**

Non-recovery expenditures	**2013**	**2014**	**2015**	**2016**	**2017**	**TOTAL**
EMERGENCY	$43,118	$4,586	$1,522	$2,097	$1,241	**$52,564**

Source: City of Calgary (2014n). Annual Report for the Year Ended December 31, 2013; City of Calgary (2015k). Annual Report for the Year Ended December 31, 2014; City of Calgary (2015m). 2013 Flood - Financials.; City of Calgary (2017a). Annual Report for the Year Ended December 31, 2016; City of Calgary (2018c). Annual Report for the Year Ended December 31, 2017.

Appendix C List of Interviews

Code	Organization	Day	Date	Time
Interview 1	Calgary Chamber of Commerce	Tuesday	February 6th	4:30 PM
Interview 2	Recovery Operations Centre	Wednesday	February 7th	10:30 AM
Interview 3	Hillhurst Sunnyside Community Association	Friday	February 9th	10:00 AM
Interview 4	Business Improvement Area	Tuesday	February 13th	12:00 PM
Interview 5	Calgary Emergency Management Agency	Wednesday	February 14th	10:00 AM
Interview 6	Community & Neighbourhood Services	Thursday	February 15th	10:00 AM
Interview 7	Recovery Operations Centre - Resilience and Infrastructure Calgary	Friday	February 16th	11:00 AM
Interview 8	Hillhurst Sunnyside Community Association	Thursday	March 1st	6:15 PM
Interview 9	City of Burnaby	Thursday	March 22nd	9:00 AM
Interview 10	SFU Emergency & Continuity Planning	Wednesday	April 4th	11:00 AM
Personal email	Resilience and Infrastructure Office	Wednesday	February 7th	

Appendix D Interview Discussion Guide

Municipal employees

- Could you briefly describe the City's recovery process?
- What was the role of your business unit during this phase?
- What was the impact of the recovery response?
- Did the City work with other organizations? Which ones? How?
- Were there previous relationships in place?
- How was the framework design?
- Could you talk about public consultation and community outreach practices during recovery?
- Did the City adapt existing procedures to address recovery? How? Why?
- What was the approach with the business community?
- How important is building resilience for the City?

Affected stakeholders

- Could you briefly describe the organization's recovery process?
- What was the role of your organization during this phase?
- What was the impact of your institution?
- Did your organization work with other institutions?
- How did your organization present its needs to the City?
- Were there previous relationships in place?
- How useful were information sessions?
- Is your organization satisfied with the municipal approach?
- Do you consider the City response to be as successful? Why?
- What would your organization do differently?