# INSTITUTIONS CONTRIBUTING TO SYSTEM ADAPTABILITY: AN ASSESSMENT OF FLOOD MANAGEMENT IN THE FRASER VALLEY

by

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#### Abstract

The flood threat has existed as long as humans have inhabited the Fraser Basin but the context is changing. Climate change is expected to impact streamflow and flood patterns in yet unpredictable ways, at the same time that population, infrastructure and economic activity continue to increase in floodplain areas in the Basin. This challenge is emerging just as significant shifts in relationships between First Nations and non-First Nations institutions in Canada are taking place. All levels of government jointly affect the adaptive capacity of the linked social-ecological system they inhabit together. In the face of such complexity and uncertainty, a system needs to have the capacity to anticipate, learn, adapt and transform, and not just react, in order to persist.

The central research question explored in this study is: *How does institutional capacity enhance and/or hinder the current, and ongoing, adaptability of the flood management regime?* Drawing on the fields of social-ecological systems, disaster management, and organizational resilience, an adaptability lens is combined with Healey et al.'s Institutional Capacity framework (1999, 2003) to explore these questions focusing on the case of a flood management regime involving the City of Chilliwack and Stó:lō Nation communities in the Fraser Valley, British Columbia.

The study is based on documentation, direct observation and twelve expert interviews conducted with representatives of key organizations. Sources of Institutional Capacity that enhance adaptability include the presence of divergence and diversity across the system, along with "learning systems" and collective "sensemaking" repertoires (i.e. the ability to interpret and act in novel situations). Barriers to enhancing adaptability were also identified. For example, an overriding belief in structurally-driven flood management is at odds with the nature of the flood hazard and potential changes. As well, the relative proficiency of the emergency management system may undermine longer-term cycles essential for resilience.

Overall, the analysis suggests that the flood management regime was adaptable in the short-term. In the mid- to long-term there are important components of institutional capacity that enhance the potential for adaptability, but a number of weak or missing elements threaten to undermine system adaptability if left unaddressed.

## Preface

This study received approval through the UBC Behavioural Research Ethics Board, under Certificate number H08-00236.

## **Table Of Contents**

Abstract	ii
Preface	iii
Table Of Contents	iv
List Of Tables	vii
List Of Figures	viii
List Of Abbreviations	ix
Acknowledgements	x
Chapter 1: Introduction	
1.1 Problem Statement	1
1.2 Purpose Of The Study	
1.3 Research Questions	1
1.4 The Case Study	2
1.5 Conceptual Framework	7
1.6 Organization Of The Thesis	9
Chapter 2: Literature Review	
2.1. Adaptability And Resilience	11
2.2. Institutional Dimensions Of Adaptability	15
2.2.1. Fit And Flexibility	15
2.2.2. Diversity	17
2.2.3. Information Management	
2.2.4. Sensemaking	19
2.2.5. Social Capital	19
2.2.6. Social Learning	20
2.2.7. Continuity & Innovation	21
2.3. Recognizing Adaptability In Practice: An Analytical Framework	22
2.4. Gaps In The Literature	25
2.5 Conclusion	26
Chapter 3: Methodology	
3.1. Overview	27
3.2. Choice Of Approach	27
3.3 Choice Of Case	28
3.4 Ethics Protocol	31
3.5 Role Of The Researcher	31
3.6 Data Collection Procedures	32
3.7 Data Analysis	
3.8 Conclusion	
Chapter 4: Institutional Profile	
4.1 Disaster Management Phases	38
4.2 History of Flood Management	
4.3 Actors	41
4.3.1 City Of Chilliwack	43
4.3.2 Stó:lō Communities	43
4.3.3 Province Of British Columbia	
4.3.4 Tribal Councils	47

4.3.5	First Nations Emergency Services Society	48
4.3.6	Fraser Basin Council	49
4.3.7	Federal Government Of Canada	50
4.4 C	onstitutional Division Of Powers	53
4.5 C	onclusion	56
Chantor	5. Institutional Canacity Analysis	57
	5. Institutional capacity Analysis	
<b>J.I.</b> I 511	Natwork Diagrams	
5.1.1 52 D	alational Posourcos	
<b>J.2</b> N	Range And Mornhology: Freshet Functions	
522	Range And Morphology: Orgoing Functions	
522	Integration	
524	Location Of Power To Act	
525	Local Vs Senior Levels Of Government	
526	First Nations Vs Non-First Nations Organizations (FNO)	76
527	Emergency Management Vs Structural Works	79
528	Freshet Vs Ongoing	81
5.3 K	nowledge Resources	
5.3.1	Range	82
5.3.2	Frames	83
5.3.3	Openness And Learning	
5.4 N	Iohilization Canacity	
5.4.1	Opportunity Structure	
5.4.2	Arenas	
5.4.3	. Repertoires	
5.4.4	Change Agents	
5.5 S	ummary: Comparing Institutional Capacity Across Subsystems	
5.5.1	Emergency Management Vs Structural Works	
5.5.2	Local Vs Senior Levels Of Government	
5.5.3	First Nation Vs Non-First Nation Organizations	
5.5.4	Freshet Vs Ongoing	
5.6 C	onclusion	
Chanter	6. Implications Of Institutional Canacity For System Adaptability	110
	troduction	110
6.2 F	it And Flevihility	110
63 D	iversity	114
64 h	iformation Management	118
6.5 S	ensemaking	
6.6 S	ocial Canital	
6.7 S	ocial Learning	
6.8 B	alancing Continuity & Innovation	
6.9 C	onclusion	
Chanter	7. Conclusion	145
71 P	eturn To The Research Questions	145 145
72 9	trengths And Limitations Of The Research	156
7.3 Δ	reas For Future Research	
7.4 C	onclusion	
Bibliogra	aphy	

Appendix A: Freshet 2007 Timeline	
Appendix B: Formal Rules, annotated	

## **List Of Tables**

Table 1. Classes of Interviewees	33
Table 2. Categories of Respondents	34
Table 3. Description of Intergovernmental Gatherings Attended	35
Table 4. Dimensions of Relational Resources	61
Table 5. Dimensions of Knowledge Resources	82
Table 6. Dimensions of Mobilization Capacity	91

## List Of Figures

Figure 1. Floodplain Map for the City of Chilliwack	5
Figure 2. Stó:lō Traditional Territory Map	7
Figure 3. Panarchy Model.	13
Figure 4. Institutional Capacity	23
Figure 5. Historical Timeline of Flood Management in the Fraser Basin	40
Figure 6. Formal Institutional Arrangements for Flood Management in BC	42
Figure 7. Flood Management Actors.	58
Figure 8. Network Diagram Legend	59
Figure 9. Preparedness and Readiness Phase: Emergency Management	62
Figure 10. Readiness and Response Phase: Stó:lō Communities	62
Figure 11. Readiness and Response Phase: City of Chilliwack	63
Figure 12. Preparedness and Readiness Phase: Emergency Structural Works	64
Figure 13. Ongoing Emergency Management	66
Figure 14. Stó:lō Dike Construction	67
Figure 15. City of Chilliwack Dike Construction	68
Figure 16. Cross-Iurisdictional Dike Construction	69
Figure 17. Adaptability Framework	147

#### **List Of Abbreviations**

BCERMS - BC Emergency Response Management System BCR - Band Council Resolution C&I - Continuity and Innovation CCG – Central Coordinating Group (BC) CF - Canadian Forces CoC - City of Chilliwack DFAA - Disaster Financial Assistance Act DFO - Department of Fisheries and Oceans (Canada) EC – Emergency Coordinator EM - Emergency Management EMBC - Emergency Management British Columbia ESS – Emergency Social Services FBC - Fraser Basin Council FM - Flood Management FNESS - First Nations Emergency Services Society FNO - First Nations Organization FPP – Flood Protection Program HC – Health Canada IC - Infrastructure Canada IC – Institutional Capacity IFHM - Integrated Flood Hazard Management INAC - Indian and Northern Affairs Canada IOD – Inspector of Dikes JEPP - Joint Emergency Preparedness Program JPC – Joint Program Committee (within FBC) LU - Land-use planning in floodplains MOE – Ministry of Environment (BC) MOU - Memorandum Of Understanding Non-FNO - non-First Nations Organization **OCP** – Official Community Plan PEP – Provincial Emergency Program PSC – Public Safety Canada MAL - Ministry of Agriculture and Lands (BC) MARR - Ministry of Aboriginal Relations and Reconciliation (BC) MOF – Ministry of Forests (BC) MOT – Ministry of Transportation (BC) RCAP - Royal Commission on Aboriginal Peoples RFC - River Forecast Centre SE - Social-Ecological SES - Social-Ecological System STC – Stó:lo Tribal Council SNS - Stó:lo Nation Society SW - Structural Works SWPreOC - SouthWest Provincial Regional Emergency Operations Centre TEAMS - Temporary Emergency Assignment Management System (BC) UBCM - Union of BC Municipalities

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## **Chapter 1: Introduction**

#### 1.1 Problem Statement

The development of society over the past decades has enabled humanity to exercise increasing reach over the resources and systems on which we depend. Tragically, awareness of our interdependence has not kept pace with our hunger for ever faster and deeper access, leading the human species and the planet towards critical ecological thresholds from the local to the global scale (Rockstrom et al. 2009; MA 2005). The problems that challenge us reflect an inherent complexity, uncertainty and unpredictability that conventional thinking and management approaches are not well-equipped to deal with.

In the face of complexity and uncertainty, a system must have the capacity to anticipate, learn, adapt and transform, and not just to react, in order to persist. Specifically, institutions<sup>1</sup> mediating the relationship between society and flood risks have a central role to play in the governance system's ability to adapt to an uncertain and changing set of conditions. The case of a flood management regime involving the City of Chilliwack and Stó:lō Nation communities in the Fraser Valley, British Columbia will be used to explore this line of inquiry.

#### 1.2 Purpose Of The Study

The main purpose of this study is to analyze the relationship between institutions and system adaptability. In addition, the case study provides specific insight into real-world policy issues in the case study area for practitioners interested in building adaptability in this or other areas of decision-making.

#### 1.3 Research Questions

The central question explored in this study is: **How does institutional capacity enhance and/or hinder the current, and ongoing, adaptability of the flood management regime?** There are two perspectives on this question—theoretical and practical—that are considered. In a

<sup>&</sup>lt;sup>1</sup> As described by Healey et al. (1999) and quoting Giddens, an institution is "an "enduring feature" of social life...giving "solidity across time and space" (Giddens 1984, 24), that is, it extends beyond formal organizations, to encompass cultural patterns (such as kinship relations, religious life, other "moral communities" and informal civic associations of all kinds)." Most commonly in this study, institutions include plans, policies and laws, as well as networks, routine procedures and other "rules of the game".

fundamental sense, the study confronts a major gap in the academic literature around the nature of the relationship between institutions and adaptability of social-ecological systems (SESs)<sup>2</sup>, and how to study this. As a result, engaging with this question required a significant degree of conceptual and methodological exploration along the way. This phase of the research engaged with the question of:

# • How can we assess the contribution of institutional arrangements to system adaptability, in practice?

A case study was used to engage in a concrete way with this question, leading to specific insights and recommendations both for methodology and real-world application. To this end, the study also examines the following questions:

- In what ways does institutional capacity vary across sub-systems of the flood management regime in this case study?
- What implications does this variation have for adaptability of the system?
- In what ways can public policy foster institutional capacity in ways that enhance adaptability?

#### 1.4 The Case Study

In the spring of 2007, residents all along the Fraser River Basin in British Columbia, Canada were placed on alert as officials and community members prepared for potentially catastrophic flooding. Some thirty-three million dollars in funding was released by the province and directed towards last-minute fortifications of structural flood protection measures, while communities readied themselves to battle the rising waters. In the end potential disaster was narrowly averted for most areas in the basin due to a fortunate change of weather, but dramatic images from the flooded Skeena Valley and the frantic preparations undertaken by all communities at risk brought a great deal of attention to issues of flood hazard mitigation and planning in the near-and long-term.

The flood threat has existed as long as humans have inhabited the Fraser Basin, but the context is changing. Climate change is expected to impact streamflow and flood patterns in yet unpredictable ways, at the same time that population, infrastructure and economic activity

<sup>&</sup>lt;sup>2</sup> "Coupled social–ecological systems (SES) represent a broad concept of people in nature (<u>Berkes et al., 2003</u>) where human systems and ecological systems are viewed as being tightly and inextricably linked." (Alessa, Kliskey and Brown 2008)

continue to increase in floodplain areas in the Basin. This challenge is emerging in B.C. just as significant shifts in the relationships between First Nations and non-First Nations governments and institutions are taking place. Furthermore, local governments and First Nations communities—the main actors responsible for flood management in B.C.—function within distinct but overlapping institutional contexts due to the constitutional separation of jurisdictions in Canada. Thus, all four levels of government (federal, provincial, local and First Nations) jointly affect the adaptive capacity of the linked social-ecological system they inhabit together.

#### 1.4.1 Fraser River Flood Hazard

The largest flood hazard in the Fraser Basin occurs during the spring (called a "freshet"), and is due to a combination of factors<sup>3</sup>:

- soil moisture levels
- proportion of water in the snowpack
- a cool spring that extends into the early summer, delaying the snowmelt
- an extended period of rapidly warming temperatures, high enough to prevent overnight freezing at high elevations
- rain during the snowmelt

These conditions create the possibility for a rapid rise in peak flows in the Fraser River and its tributaries that can lead to flooding. While much of the Fraser Valley is protected by flood works, some areas are not. In addition, a recent study found that the flood design profile used as the basis for dike design (based on the 1894 flood level), is not an accurate measure of contemporary flood levels due to changes in the flood channel over time. Dikes protecting many communities would not be sufficient to prevent flooding if 1894 river levels were to occur today (FBC 2006a).

#### **1.4.2 Community Attributes**

The City of Chilliwack (CoC) and the Stó:lō First Nations in that area are located between the Fraser River and a magnificent mountain range. Part of the City, and a number of the First Nations are located within the floodplain (Figure 1). Chilliwack is a city of around 76 000 people, comprised of 3 distinct communities on the valley floor (Chilliwack, Vedder and Sardis) and a number of growing hillside suburbs (CoC 2008a). The area is a combination of urban and

<sup>&</sup>lt;sup>3</sup> http://www.fraserbasin.bc.ca/programs/flood\_faqs.html, Accessed 06/04/08

rural, with active agricultural areas across 65% of the land base (Economic Partners Corporation 2007). Its substantially built-up downtown, home to government buildings, a regional hospital and a business district, is located entirely in the Fraser River floodplain and protected from the river waters by a comprehensive diking and flood control system.



**Figure 1. Floodplain Map for the City of Chilliwack (Source: City of Chilliwack, April 2007<sup>4</sup>)** *City of Chilliwack's municipal boundaries—the Fraser River is along the top edge of the map. Blue areas are unprotected land, white areas are in the floodplain but protected by a dike and green areas are out of the floodplain. First Nations communities are not represented—Shxwa:y, Skwah and Squiala are located in the blue area around the "Wing Dyke" and "Town Dyke" labels* 

<sup>&</sup>lt;sup>4</sup> Retrieved from: www.chilliwack.com/main/page.cfm?id=346

The Stó:lō First Nations (Figure 2) have been resident in this area for thousands of years—the earliest archaeological record of their presence dates to around 10 000 years ago. The Stó:lō are part of the Coast Salish people and the Halkolmelem language group (FBC 2006b). The administrative offices of the Stó:lō Nation, one of the main governing bodies for this group of nations, are located in the southern part of the Chilliwack area. There are eight Stó:lō communities within the Chilliwack area alone (Shxwa:y, Skwah, Squiala, Kwawkwawapit, Aitchelitz, Skowkale, Yakweakwioose, Tzeachten), ranging in population from a few tens of people to three or four hundred people in each. In total, seven Stó:lō communities are outside of the dikes, including Shxwa:y, Skwah and Skwahli in the Chilliwack area (MARR 2007). At the time that dikes were being constructed, agreement could not be reached across the parties on a dike right-of-way (FBMP 1994). The result is that Chilliwack's dikes neatly track the boundary behind these First Nations' territory, leaving them strikingly vulnerable to Fraser River flooding (Wood 2007).



**Figure 2. Stó:lō Traditional Territory Map.** Reproduced with permission from the Stó:lō Research and Resource Management Centre.<sup>5</sup>

#### 1.5 Conceptual Framework

#### 1.5.1 Adaptability And Resilience

A common definition of resilience for social-ecological systems is given by Walker et al. (2004), as "the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity and feedbacks." Adaptability is "the capacity of actors in the system to influence resilience" and transformability is "the capacity to create a fundamentally new system."

When dealing with the governance side of social-ecological systems, it is this "capacity to manage resilience," or adaptability, that is of interest (Lebel et al. 2006). Given the nature of the changes facing flood management—specifically, climate change and First Nations involvement in governance as key drivers of change—it is the author's assertion that adaptability is a

<sup>&</sup>lt;sup>5</sup> Accessed 20/10/10 at: http://www.bctreaty.net/nations/soi\_maps/Stolo\_Nation\_SOI\_map\_ammended.jpg

desirable and appropriate orientation; furthermore, adaptability at present and transformability over the longer term are required for the system to be resilient (Lengnick-Hall and Beck, 2005; Young 2006). In other words, it is the ability to maintain resilience to levels of variability in the present and over time, that constitutes adaptability of a system (Young 2006).

A system must have the capacity to anticipate, learn, adapt and transform, and not just to react, in order to persist. Innes and Booher (2003) refer to a system's individual, organizational, relational and governance capacity as determinants of resilience:

A governance system with capacity is resilient—that is, it responds quickly to new conditions, events, opportunities and problems, and adapts and changes its procedures, heuristics and relationships as needed. It constantly improves its economic, environmental and equity performance, or slows down or reverses negative change. It is in a constant state of institutional evolution as it adjusts to maintain a sustainable system. (p.18)

The concepts of adaptability and resilience, despite their popularity and widespread use, are still being defined for evaluation in empirical settings, where social and governance apparatuses are less theorized than ecological components of SESs. In order to conceive of adaptability for a flood management regime, this study draws on the literature on social-ecological systems, disaster management, water resource management and climate change studies on resilience to identify a set of eight characteristics contributing to institutional adaptability: fit, flexibility, diversity, social learning, sensemaking, social capital, information management and continuity & innovation (see Chapter 2 for a review of the literature).

#### **1.5.2 Institutional Analysis**

For the purposes of this investigation a broad definition of *institution* is employed. As described by Healey et al. (1999) and quoting Giddens, an institution is "an "enduring feature" of social life...giving "solidity across time and space" (Giddens 1984, 24), that is, it extends beyond formal organizations, to encompass cultural patterns (such as kinship relations, religious life, other "moral communities" and informal civic associations of all kinds)." Most commonly in this study, institutions include plans, policies and laws, as well as networks, routine procedures and other "rules of the game"<sup>6</sup>. Thus, the term *institution* is distinct from its common meaning as a synonym for *organization*. As used in this study, organizations are some of the actors engaged

<sup>&</sup>lt;sup>6</sup> This could include neighbourhoods, organizations, governments and other forms of social organization, but the scope of this study is restricted to institutions relating to or interacting directly with local municipal and First Nations governments on issues of flood management and response.

within the complex of institutional arrangements that frame collective action opportunities and constraints. Actors affect, and are affected by, institutions in a dynamic relationship.

There are various ways of looking at the role institutions play in collective action situations, which provide insight into options for developing capacity to manage resilience and adaptability. Each focuses on different aspects of the relationship between institutions and behaviour, and how institutions come into being and change (Hall and Taylor 1996). The Institutional Capacity framework (Healey et al. 1999, 2003; Healey 2006) looks at institutional qualities of significance for intergovernmental processes, in a context of change and evolution of the system itself. Within the wide ranging field of institutional theory, the work of Innes and Booher (2003) and Healey (2006) and colleagues (Healey et al. 1999, 2003) is chosen because it also conceives of institutional arrangements as complex systems that continually change and evolve. As well, this framework reflects an understanding of knowledge as socially constructed, and takes the view that actors and institutions influence each other in a dynamic relationship. Chapter 3 more fully describes the significance and application of this perspective to this particular case study.

This study explores how actors and networks are able to draw on, and develop, institutional capacity, in ways that enhance or hinder adaptability of the system. While resilience is most apparent during times of stress or crisis, adaptability is required over the long-term to ensure the viability of the system. Flood management may be perfectly adapted to present conditions, but could be useless if conditions change in particular ways. Moreover, the understanding of adaptability as "capacity to manage resilience" leads also to the observation that institutions can alter flood *risk* over time. In other words, institutions may reduce the net "capacity to manage resilience" by increasing the flood risk itself, despite other positive developments in institutional capacity.

#### 1.6 Organization Of The Thesis

Chapter 1 introduces the research problem and questions and provides an introduction to the case study. Chapter 2 provides a review of related literature on adaptability and institutional analysis of complex systems, culminating in a description of the frameworks used to guide the study. In Chapter 3 a description of methods and data collection is provided. The institutional profile presented in Chapter 4 gives background on the institutions and actors of relevance for this case study, and discusses the dynamics of Local and Senior levels of government, and First Nations

and Non-First Nations institutions in the Canadian context. Chapter 5 presents an Institutional Capacity (IC) analysis of the flood management system by drawing comparisons across subsystems of this regime. This is followed by a discussion of implications of IC for adaptability of the flood management regime in Chapter 6. Chapter 7 summarizes the conclusions, the limitations of the study and its contributions to the field, as well as suggestions for policy and future research.

## **Chapter 2: Literature Review**

This study draws on ideas of adaptability and the closely associated concept of resilience from the fields of ecology, social-ecological systems, disaster management and organizations. This informs the understanding of system dynamics and their manifestation specifically in the case of flood management for the case study. Eight adaptability features relating to institutions are identified and introduced. In order to connect these adaptability dynamics and outcomes back to the influence of institutional variables, the Institutional Capacity framework is chosen as a basis for analysis. An overview of this framework and the features that made it appropriate for this study, are discussed.

#### 2.1. Adaptability And Resilience

Adopting a systems perspective in decision-making is one of the shifts necessary to correct the current course. This study defines the research problem in systems terms, and focuses on *intergovernmental* institutional capacity for flood management, given that the nature of the flood hazard and institutional responses to it are inherently cross-scale problems. The theories of adaptability and resilience, which are the fundamental basis of the conceptual framework, also assume a systems perspective.

At a system level, adapting to flood risk crosses two domains of understanding about the concept of resilience: social-ecological and disaster resilience. Neither concept on its own provides a full understanding of resilience for this type of phenomenon; rather, the two together provide a better picture of system resilience to flooding.

#### 2.1.1. Ecological And Social-Ecological Resilience

The concept of resilience in ecological systems was first described by Holling (1973). His definition states that "resilience determines the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables, driving variables, and parameters, and still persist" (Holling, 1973; 17). Implicit in this definition is the assumption that multiple equilibria are possible, and that change may be absorbed without fundamentally changing the system—that is, while remaining within a "stability domain" (Holling 1973). Pimm (1984) defined resilience as "how fast the variables return towards their equilibrium following a perturbation." This definition applies to linear systems or non-linear systems close to equilibrium (Gunderson 2000). It assumes that systems have a single

equilibrium, and this trait has been described by others as "stability" rather than resilience (Holling 1973, 1986).

As awareness of the nature of interactions in human-environment systems has developed, so too has the concept of ecological resilience as applied to joint social-ecological systems. The most often used definition of ecological resilience is given by Carpenter et al. (2001), incorporating the three dimensions of 1) magnitude of disturbance that can be absorbed without switching domains; 2) self-organizational ability and; 3) adaptive capacity. Although this concept is often expressed simply as the ability to bounce back from a disturbance with minimal damage and persist, the notion of resilience employed here implies an ongoing process of learning that is incorporated into action to enhance a system's ability to deal with change (Folke et al. 2005). A key issue is that social and socioeconomic resilience cannot be understood without reference to the institutional context (Levin et al. 1998; Adger 2000; Perrings 1998).

The models of the "adaptive cycle" (Holling 1986) and "panarchy" (Gunderson and Holling 2002) in the social-ecological resilience tradition have been particularly central to the interpretations and understanding of systems dynamics applied in this case study. The adaptive cycle model characterizes systems as combined social-ecological entities that are in constant flux, but within a certain "domain" that can be defined in terms of structure and function. A system's resilience to shocks is compromised when it passes certain thresholds, taking it into a new domain. Returning a complex system to its original domain is in many cases not possible, once a "flip" has occurred. This differs from conventional descriptions of systems as approaching an equilibrium state where transitions may be reversed in a linear fashion. The panarchy model acknowledges the existence of many scales of adaptive cycles that make up a system (and systems of systems), depending on where the boundaries are drawn, and incorporates the observation that these cycles-from large, slow cycles to small, fast cyclesinteract and can lead to cascading effects across scales and systems (Figure 3). This is similar to Kendra and Wachtendorf's (2003) concept of "telescoping" effects where the resilience of one part affects resilience of its constituent system and any larger systems above that; however, this is presented as a positive relationship, whereas panarchy allows for positive or negative relationships across scales.



**Figure 3.** Panarchy model showing the relationship between two "adaptive cycles" –one larger and slower, the other smaller and faster. Each scale is in a dynamic state, within a particular "stability domain" From *Panarchy*, Edited by Lance H. Gunderson and C.S. Holling. Figure 3-10, Chapter 3: "Sustainability and Panarchies." Copyright © 2002 Island Press. Reproduced by permission of Island Press, Washington, D.C.

#### 2.1.2. Disaster Resilience

Mileti (1999) defines local disaster resilience as the ability to "withstand an extreme natural event without suffering devastating losses, damage, diminished productivity, or quality of life and without a large amount of assistance from outside the community." This definition is followed often, including by Godschalk (2003).

Earlier in the literature, Wildavsky (1988) characterized resilience as a complement of anticipation in determining the effectiveness of disaster response. In this formulation, anticipation refers to "a mode of control by a central mind; efforts are made to predict and prevent potential dangers before damage is done." A balance must be struck between this dimension and resilience, defined as "the capacity to cope with unanticipated dangers after they have become manifest, learning to bounce back." As well, the idea of resilience as "learning to bounce back" is dominant in the disaster literature, where the capacity to learn and innovate is emphasized (e.g. Comfort, 2005). Kendra and Wachtendorf (2003) argue that rather than the two concepts being distinct, instead anticipation is an inherent part of resilience.

Another series of studies has defined resilience in terms of four characteristics: robustness, rapidity, resourcefulness and redundancy, combining the concepts of magnitude of disturbance that may be absorbed, with recovery time (Bruneau et al. 2003; Tierney 2003; Chang and

Shinozuka 2004). These are considered along four dimensions of community resilience: technical, organizational, social and economic.

#### 2.1.3. Adaptability

One of the key differences between disaster resilience and social-ecological resilience is the scale used to define the problem. Disaster is a short-term shock inflicted on the system of interest that is contained in scale. In contrast, SES resilience looks at the interactions of humanenvironment systems over time and how these systems are interrelated and interdependent—in other words, how they co-evolve. The issue of resilience to flooding includes, and challenges, both of these starting points. Disaster resilience does not generally incorporate ecological dynamics or longer-term feedbacks into its unit of analysis (Chang and Crawford Boettcher 2007). On the other hand, and in contrast with other SES problems, the dynamics of flooding are largely determined by forces outside of resource management systems themselves, such as weather patterns—they are in part a product of human interaction with the environment, and in part a "singular, unexpected, anomalous event" (Kendra and Wachtendorf 2003). Thus, resilience to flooding exists at the boundaries of each of these concepts, falling somewhere in between.

The base definition of resilience is given by Walker et al. (2004) as "the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity and feedbacks." Adaptability is "the capacity of actors in the system to influence resilience," or the ability of actors to maintain resilience over the long-term. Nelson et al. (2007) provide a comparison of resilience and adaptation traditions of research, arguing that the systems-oriented perspective of resilience "provides a useful framework to analyze adaptation processes and to identify appropriate policy responses" that complements the typically actor-centered research on adaptation to global environmental change.

The concept of "adaptability" as defined in Walker et al. (2004) was adopted as the focus of this analysis because it can apply to management of resilience both in a disaster context and in a social-ecological context. As well, it accommodates the idea that humans actively exercise their influence on system resilience through formal and informal institutions, and that adaptability is a creative process of learning and action.

#### 2.2. Institutional Dimensions Of Adaptability

One of the challenges of the research problem is that resilience and adaptability are abstract qualities of a system. Resilience as a system property is not demonstrated until the point where a shock is introduced, stressing the system. It is relative to a given context and a particular type of shock (i.e. resilience *to what? for whom?* (Nadasdy, 2007)). Adaptability may be understood as a *capacity* of a system, without a specific form. Likewise, Innes and Booher (2003) claim that while adaptability in the longer term may be apparent, in the present it is more difficult to distinguish. Nonetheless, they suggest that the "working pieces" of adaptability in a given institutional or governance system may be recognized. Based on a review of social-ecological resilience, disaster resilience, organizational resilience and adaptive water management literatures, eight dimensions are identified as central to the way that institutions impact system adaptability. This serves as a guide throughout the research—from data collection through the analysis—and is informed and refined along the way, through engagement with the case study itself. The eight dimensions are:

- 1. Fit
- 2. Flexibility
- 3. Diversity
- 4. Information Management
- 5. Social Capital
- 6. Social Learning
- 7. Sensemaking
- 8. Continuity & Innovation

#### 2.2.1. Fit And Flexibility

The concept of fit refers to the degree to which institutional design matches the nature of the issue it is intended to manage, in this case flood risk. Flexibility refers to the ability of that design to respond to variation and change. The two are presented together as flexibility bears directly on the system's ability to enhance or restore fit; thus, the two are intrinsically related in an adaptability context.

Young (2002) discusses three major problems—fit, interplay and scale—that were identified by the Institutional Dimensions of Global Environmental Change program. *Fit* refers to the relative match or mismatch between properties of natural systems and of institutional regimes. *Interplay* 

describes issues of interactions between and among different institutions, while *scale* looks at the notion of transferability or scaling up and down in space and time.

An example of Fit would be when experiential knowledge doesn't inform higher level plans which mis-manage a resource as a result. Another commonly cited scale problem for water resource management regimes occurs when jurisdictional boundaries do not correspond with ecological boundaries of the water system. The idea of institutional fit has been presented to explain some of the recurrent challenges and issues in environmental and resource management contexts (Cash and Moser 2000, Young 2002, Cash et al. 2006). More specifically, institutional fit is identified as a prominent factor impacting the resilience of SESs (Folke et al. 2007, Lebel et al. 2006). The structure of institutions themselves has been raised as a key feature impacting adaptability and resilience. Lebel et al. (2006) highlight polycentric, flexible institutions as a component of adaptability. The importance of flexibility is reflected strongly in the disaster literature (Baker and Refsgaard 2007; Tierney and Trainor 2005; Kendra and Wachtendorf 2003; Tierney 2003), and adaptive water management (Pahl-Wostl et al. 2007).

Cross-jurisdictional coordination issues, particularly, are highlighted as a key problem in effective environmental management and water resource management especially (Berkes 2002, Adger et al. 2005, Blomquist et al. 2005, Naess et al. 2005). In addition to the impacts in terms of fit, there is a vertical dimension of interplay that arises from cross-scale interactions (Young 2006). Adding to that is the issue of horizontal interplay, often discussed in terms of bureaucratic fragmentation or "silos" and the implications of that compartmentalization for environmental management (Young 2002, Pinkerton 2007, Dale 2001).

Cash et al. (2006) use the idea of cross-scale and cross-level interactions to explain some of the issues that the institution-environment interface gives rise to. By their definitions, scale refers to "the spatial, temporal, quantitative or analytical dimensions used to measure and study any phenomenon" (e.g.: space, time, jurisdictions, knowledge, networks) and levels are "units of analysis that are located at different positions on a scale" (e.g.: national, provincial or municipal jurisdictions). According to the authors, there are three key "scale challenges" associated with cross-scale and cross-level interactions, which impact resilience. *Ignorance* of scale and level interactions and a failure to recognize a *plurality* of ways of perceiving and valuing different

scales can compromise resilience of a system. Thirdly, *mismatch* describes a problem of fit between different scales.

Olsson et al. (2004) discuss adaptive co-management as an institutional response addressing cross-scale challenges. According to the authors, the "essential features for self-organization and emergence of adaptive co-management of ecosystems" include:

- enabling legislation that creates social space for ecosystem management;
- funds for responding to environmental change and for remedial action;
- ability to monitor and respond to environmental feedbacks;
- information flow and social networks for ecosystem management;
- combining various sources of information for ecosystem management;
- sensemaking for ecosystem management; and
- arenas of collaborative learning for ecosystem management.

Tierney and Trainor (2005) identify characteristics and strengths of Emergent Multiorganizational Networks (EMONS) that contributed to disaster resilience, including: enhanced organizational learning, transfer of legitimacy, fostering development and diffusion of innovations, responsiveness, replicative and generative redundancy, information transfer, quicker adaptation, openness and creativity, providing a locus for collective sensemaking and organizational learning. Essentially, EMONS "enhance resilience because they raise the probability that needed information and resources will become available through network ties and because they empower even network newcomers..." (Tierney and Trainor 2005).

#### 2.2.2. Diversity

In a context of uncertainty, complexity and change, it is not possible to predict exactly which resources will be needed in the future. The presence of diversity represents potential sources of memory, redundancy and innovation in the system.

There has been a longstanding debate about the role of diversity in stability or resilience of systems (e.g. Holling 1973; Pimm 1984). It has been suggested that species diversity relates to resilience in terms of increased functional diversity within and across scales. That is, where species perform diverse and overlapping functions within a scale and reinforce it with apparent

redundancy across scales, ecological resilience is generated. This allows more flexibility in a system's response to perturbations across a range of scales (Peterson et al. 1998).

Disasters or disruption create a dynamic situation with high potential and opportunity; however, adequate stabilizing elements must be present to maintain the system (Holling, 1996; Gunderson, 2000). These are often referred to as diversity, which can be distinguished into two key elements across disciplines: redundancy or functional diversity; and sources of renewal and reformation. Redundancy refers to the existence of resources and actors/species that can step in to fill roles that are disrupted in the case of a disaster or other change (Peterson et al., 1998; Sutcliffe and Vogus, 2003; Weick, 1993; Mallak, 1998; Tierney and Trainor, 2005). Sources of renewal and reformation may emerge from assets such as memory, social capital, networks and processes of learning and innovation (e.g. Gunderson, 2000; Tierney and Trainor, 2005; Godschalk, 2003; Adger, 2000; Comfort 1999). The sense of system memory has been discussed in ecological (Gunderson, 2005; Gunderson and Holling 2002) social-ecological (Berkes et al., 2003), social (Tierney and Trainor, 2005) and organizational (Lengnick-Hall and Beck, 2005) systems. Folke et al. (2005) describe the importance of diversity and redundancy in institutions that overlap functionally across scales.

#### 2.2.3. Information Management

In addition to having a diversity of types of knowledge present, adaptability depends on information connecting and interacting at a system level to inform decision-making and action at all levels and in response to unforeseen circumstances.

A feature of resilient systems is their arrangement into networks within and across scales of organization that facilitate communication and other types of information or resource exchange. Comfort (1994, 1999) has explored the role of information extensively in disaster response, highlighting the importance of a combined socio-technical approach to this dimension of resilience. Godschalk's (2003) definition is built on the idea that a resilient community is a joint social and physical network, and Mallak's (1998) survey of an organizational context identified access to multiple information and resource sources as two key features. Similarly, communication and connections are two of seven streams of resilient behaviour according to Horne and Orr (1998). Tierney (2003) identifies social and organizational networking as key to resourcefulness in disaster response. As well, institutions should be structured to encourage

integration across agencies and organizations, and to enable communication between all levels of government, including interoperability of communication systems (Baker and Refsgaard 2007).

#### 2.2.4. Sensemaking

Among the most important characteristics for social systems in the resilience literature is the importance of sensemaking following Weick (1993), which has emerged in the context of disasters (Tierney 2003; Tierney and Trainor 2005; Kendra and Wachtendorf 2003; Baker and Refsgaard 2007) as well as organizational resilience (Lengnick-Hall and Beck, 2005) and adaptive co-management (Olsson et al. 2004). As described by Weick (1993) "[the] basic idea of sensemaking is that reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs." Weick (1995) outlines seven commonly recognized properties of sensemaking as: grounded in identity construction; retrospective; enactive of sensible environments; social; ongoing; focused on and by extracted cues, and; driven by plausibility rather than accuracy.

Kendra and Wachtendorf (2003) emphasize the creative dimension of resilience as "...socially constituted adaptability to unpredictable ambient forces". They are interested in "[a] concept of resilience as the product of a kind of craft skill, or an artistic interpretation and response to singular, unexpected, anomalous events as opposed to a rationalized predetermined response to what is regular or expected." Another parallel is the ability of groups to act on the understanding that change or disaster is a reality, for example in the context of resource management (Berkes et al. 2003).

#### 2.2.5. Social Capital

Social capital refers to the density of connections between actors, and associated relationships based on trust, mutual understanding and reciprocity (Rydin 2006). The concept of social capital is referred to ubiquitously in many areas of study. In 1973, Granovetter articulated "the strength of weak ties" in describing social capital. Putnam's well-known work (e.g. Putnam 1993, 1995, 2000) sparked widespread awareness of the concept, as it spread into the lexicon of social sciences (and society) broadly. In the field of natural resource management, the work of Elinor Ostrom has been particularly influential and has shown ways in which social capital can contribute to better collective decision-making around common property resources (Ostrom 1990, 1999).

Social capital is widely recognized as contributing to the resilience and adaptability of systems (Olsson et al. 2004; Folke et al. 2005; Pahl-Wostl et al. 2007; Baker and Refsgaard 2007; Lebel et al. 2006; Adger et al. 2005; Pelling and High 2005; Tierney and Trainor 2005). This can be built through participatory planning processes (Baker and Refsgaard 2007). Networking, or bridging, social capital is also a key component in disaster and ecological adaptability (e.g. Kendra and Wachtendorf 2003; Tierney and Trainor 2005; Olsson et al. 2006; Baker and Refsgaard 2007; Adger 2003). Folke et al. (2005) describe social capital in terms of bridging and bonding links that are informed by relevant knowledge of ecosystem dynamics. This includes the capacity to process information, make sense and use of scientific data, mobilize social memory and facilitate adaptive and innovative responses. Armitage et al. (2008) identify social capital as a product of, and input to, social learning.

#### 2.2.6. Social Learning

Social Learning is recognizable as: "a change in understanding that goes beyond the individual to become situated within wider social units or communities of practice through social interactions between actors within social networks" (Reed et al., 2010). The concept of social learning has roots in the work of Argyris and Schon (1978) who described the difference between single and double loop learning. Single loop learning involves recognizing errors, but in such a way that an organization can continue to pursue existing policies and objectives. Double loop learning occurs when error detection leads to changes in underlying norms, policies and objectives (Argyris and Schon 1978). This involves processes of collectively reframing problems, ongoing dialogues and transformation that contribute to adaptive potential of an organization (Romme and van Witteloostuijn 1999). Triple loop learning is a process of "collective mindfulness': members discover how they and their predecessors have facilitated or inhibited learning, and produce new structures and strategies for learning" (Romme and van Witteloostuijn 1996). Armitage et al. (2008) apply the concept to multiple levels of learning in an environmental and resource management context.

This is echoed in characterizations of organizational resilience to disaster, where resilience is defined by the ability to draw on resources in new and novel ways to respond to unique events as they unfold. Ongoing translation of experience or foresight into mitigation, response and recovery planning is an integral part of the process of resilience (Kendra and Wachtendorf, 2003). This is also a common and overarching theme in the ecological resilience literature where

learning linked to ecosystem properties is a fundamental requirement of resilient socialecological systems (Olsson et al. 2004, Folke et al. 2005). In considering what gives rise to successful climate change adaptation across scales, Adger et al. (2005) argue that an ideal formulation of adaptive capacity is "a synergy between state and civil society...that promotes social and policy learning" (p. 394). Social learning, and the key role of institutions in its production, is a core focus of current work on adaptive water resource management (Pahl-Wostl et al. 2007, Naess et al. 2005).

Again, this is captured in the dominant ecological definition of resilience (Carpenter et al. 2001). Pickett et al.. (2004) emphasize the "learning loop" in resilient urban systems. In various places, public process has been advocated as an opportunity for social learning that can enhance resilience (Berke and Campanella, 2006; Comfort 2005; Godschalk, 2003; Gunderson, 2000). In a similar way, ongoing translation of experience or foresight into mitigation, response and recovery planning is an integral part of the process of resilience (Kendra and Wachtendorf, 2003; Berke and Campanella, 2006; Burby et al. 2000; Chang and Shinozuka, 2004; Tobin, 1999). The social-ecological equivalent is known as "adaptive management" (Gunderson, 2000).

Based on European water management research on social learning, Pahl-Wostl et al. (2007) have developed three key requirements that can be used to guide assessment of a regime's capacity to be adaptive:

- new information must be available and/or collected...and monitored over appropriate time scales that are generally longer than those mandated by short-term political objectives;
- 2. the actors in the management system must be able to process this information and draw meaningful conclusions from it; and
- change must be possible in ways that are open and understandable to all the actors...it is necessary to strike a balance between continuity and flexibility

#### 2.2.7. Continuity & Innovation

Across disciplines, the need to balance stability of a system with creativity and innovation is a common theme. The concept of balancing C&I is an ideal state towards which the other working pieces of adaptability are oriented, and that must be constantly redefined as parameters change over time.

Comfort (1994) refers to the concept of the "edge of chaos" from complex systems theory to denote this ideal balance. In the ecological literature it is suggested that allowing for ongoing disruptions at smaller scales may protect resilience of the larger system (Holling, 1986). In terms of organizational systems, Tierney (2003) has shown how social and organizational resourcefulness may effectively apply available resources in the wake of destruction. Kendra and Wachtendorf (2003) witnessed this tension as recognizing what elements of a situation are the same and different, and having the capacity to innovate and incorporate that learning into subsequent response.

It is through this element of adaptability that the significance of dynamic tensions in a system comes to the fore. Fundamentally, C&I brings attention to the interplay between agency and structure in a socio-political system. In terms of social ecological adaptability, it is also about tensions between flexibility & rigidity, proactive & reactive, tried and tested & experimental and innovative, as well as tension across scales in a system. These dynamics are not, and should not, be mutually exclusive; rather, the complexity of a system requires that IC is developed in such a way that a mix of tensions exists in order to locate the system close to the edge of chaos while maintaining its functional integrity.

#### 2.3. Recognizing Adaptability In Practice: An Analytical Framework

Analytical frameworks for exploring how institutions relate to adaptability were still at the stage of working hypotheses as this study was being defined (e.g. Lebel et al. 2006; Pahl-Wostl et al. 2007; Naess et al. 2005; Anderies et al. 2004). At the same time, there are now increasing areas of overlap between studies in collaborative planning and those exploring resilience of social-ecological systems (Goldstein 2009). The Institutional Capacity framework (Healey et al. 1999, 2003; Healey 2006) was ultimately chosen because it provided a way to specify institutional qualities of significance for intergovernmental processes, in a context of change and evolution of the system itself.

There are a number of additional elements that led to the use of the Institutional Capacity framework as the analytical lens for this study. Exploring adaptability and resilience in socialecological systems and the element of ongoing change were major dynamics that had to be accommodated in the approach to institutional analysis. As described by Innes and Booher (2003) "A governance system with capacity is resilient—that is, it responds quickly to new conditions, events, opportunities and problems, and adapts and changes its procedures, heuristics and relationships as needed...It is in a constant state of institutional evolution as it adjusts to maintain a sustainable system" (p.18). Thus change, adaptation and resilience are part of the basic model of institutional capacity from the outset. There is common ground between institutional capacity and resilience approaches arising from their recognition of complex, adaptive system dynamics in the social and ecological systems they study; thus, their parallel interests in elements such as networks, interdependence, dynamic tensions, diversity, collaboration and learning. The centrality of change to the IC approach is reinforced in the model in Figure 5, which takes change as given within its foundational characterization of the dialectical relationship between external and internal forces, and the mutually constitutive basis of institutions and actors.



Figure 4. The Concept of Institutional Capacity (Reproduced with permission from Healey et al. 2003, p.64)

There are various ways of looking at the role institutions play in collective action situations, which provide insight into options for developing the capacity to manage resilience and adaptability. Each focuses on different aspects of the relationship between institutions and behaviour, and how institutions come into being and change (Hall and Taylor 1996). For the purposes of this investigation a broad definition of *institution* is employed. As described by Healey et al. (1999) and quoting Giddens, an institution is "an "enduring feature" of social

life...giving "solidity across time and space" (Giddens 1984, 24), that is, it extends beyond formal organizations, to encompass cultural patterns (such as kinship relations, religious life, other "moral communities" and informal civic associations of all kinds)." Most commonly in this study, institutions include plans, policies and laws, as well as networks, routine procedures and other "rules of the game"<sup>7</sup>. Thus, the term *institution* is distinct from its common meaning as a synonym for *organization*. As used in this study, organizations are some of the actors engaged within the complex of institutional arrangements that frame collective action opportunities and constraints. Actors affect, and are affected by, institutions in a dynamic relationship.

Institutional analysis incorporates a network analysis to identify which actors are involved, what their positions are, and how they are connected (e.g. through flows of knowledge and resources; bonds of trust, values, reciprocity, exchange, obligation, regulation, power, etc). In so-called "new institutionalist" traditions, this step meets with a "mid-range" theory (Rydin 2006) to provide particular insight deriving from a predominantly historical, economic/rational-choice, or sociological perspective on institutions (Hall and Taylor 1996). The mid-range theory employed for this study is that of "Institutional Capacity," developed by Healey and colleagues and building on work by Innes and colleagues. Based on observations of consensus-building processes and interactive governance contexts, Innes and colleagues identify three types of capital: intellectual, social and political capital (Innes et al. 1994). Building on this, Healey et al. (1999) gathers the three capitals under the term "institutional capital" and renames them knowledge resources (K), relational resources (R), and mobilization capacity (M). Institutional capacity (IC) is "...built up through the way external forces and local traditions mesh together in the flow of knowledge development and circulation [i.e. knowledge resources], social networks and bonding values [i.e. relational resources] and the manner in which they are translated [i.e. mobilization capacity] into pro-active efforts to organize strategically to shape and change the dynamics in which people and firms in places find themselves" (Healey et al. 1999, 124).

The institutional capacity approach put forward by Healey and colleagues takes a relational, social constructivist perspective and "expresses the complex interactions between "structuring" driving forces and the active work of agency in inventing ways of going on" (Healey et al. 1999, 124). Capacity is seen as continually evolving—it can be enhanced through intentional actions as

<sup>&</sup>lt;sup>7</sup> This could include neighbourhoods, organizations, governments and other forms of social organization, but the scope of this study will be restricted to institutions relating to or interacting directly with local municipal and First Nations governments on issues of flood management and response.

well as degraded through neglect. A key concern of this approach is to understand the potential for governance to manage and direct the combination of external and internal forces towards a desired end—in this study, that of adaptability and resilience (Healey et al. 1999).

Each of the three capitals of interest in this framework is explored through four criteria. The category of Knowledge Resources reflects an idea of knowledge as socially constructed—that is, information and facts are actively produced as opposed to objectively existing—and asks that attention be paid to the levels of knowledge underlying action, as in the description of double- or triple-loop learning in work by Argyris and Schon (1978) and Flood and Romm (1996), respectively. Relational Resources covers the dimension of network analysis together with elements similar to the concept of social capital. The distinction of Mobilization Capacity from other capitals has also been used in work on adaptation and resilience (Nelson et al. 2007).

#### 2.4. Gaps In The Literature

This study draws on a long history of institutional analysis while contributing to the more recent area of inquiry into the role of institutions in determining the resilience of social-ecological systems (Adger 2000; Hotimsky, Cobb and Bond 2006; Jordan and O'Riordan 1995). Handmer and Dovers (1996) suggest that institutions themselves may exhibit proactive or reactive resilience, and most action tends to be "change at the margins," not adaptive in nature. As well, the concept of social-ecological resilience is being developed and elaborated with respect to the contributions of institutions (Adger 2000; Folke et al. 2005). This study is a response to these gaps in the literature. Furthermore, it adds to ongoing work exploring climate change adaptation in Canada (e.g. Wall and Marzall, 2006; Berkes and Jolly, 2001).

At a most basic level, there is still a need to build understanding of the nature of the relationship between institutional factors, and adaptability or resilience. This study takes a novel approach in drawing principally from the social-ecological and disaster resilience fields in its characterization of adaptability, and its relationship to institutions. Each of these fields was missing pieces of the picture, and drawing the two together creates a more well-rounded understanding of systems like flood management regimes that span these domains.

Theories of institutional adaptation that are compatible with a social-ecological system perspective on the problem, were still in the stage of working hypotheses as this study

developed. Frameworks presented in studies such as Anderies et al. (2004) or Lebel et al. (2006) are given as a starting place with need for testing and development. Additionally, methodologies and studies in the social-ecological resilience field were still in the process of integrating the wealth of established theory and methodology in the social sciences. This analysis is based in an institutional framework from collaborative planning; hence, it begins with a social science perspective as well as extending the inquiry into a field with a keen interest in application of research to actual decision-making.

#### 2.5 Conclusion

Based on the general concepts and understanding of system dynamics articulated in socialecological and disaster resilience, this study proposes an analytical framework bridging adaptability dynamics and outcomes with the influence of institutional factors. The next chapter explains how these conceptual and analytical frameworks were operationalized to explore intergovernmental action on flood management in the case study.
# **Chapter 3: Methodology**

## 3.1. Overview

There are two overarching characteristics to the methodology: it is qualitative and it incorporates a range of sources of data in an effort to stay open to unanticipated perspectives and to verify interpretations. A mixed methods approach was used to develop and connect features of institutional analysis with adaptability and resilience theory.

The central source of data is a set of twelve expert interviews conducted between June 2007 and October 2008, with a range of key representatives of organizations that were centrally involved in intergovernmental preparation and response to the 2007 freshet event in the case study area (including First Nations and non-First Nations, Senior and Local governments, and Emergency Management and Structural Works). These individuals provided detailed information on the way institutions operate in practice<sup>8</sup>. Publicly available documents (policies, laws, reports, websites, etc) are used to augment and verify descriptions of institutions in practice. Finally, attendance at a number of related intergovernmental forums provided valuable insight into actors and relationships between them, for this case study.

The Institutional Capacity (IC) framework is used deductively in a qualitative analysis, to lead from a descriptive account of the case into identification of significant institutional elements that contribute to the capacity for responsiveness, development and change in a system. Key patterns and issues emerging from the IC analysis are then interpreted for their significance in terms of the eight adaptability features.

# 3.2. Choice Of Approach

## 3.2.1 Value And Logic Of A Qualitative Case Study Approach To This Problem

The starting point of this study is to understand the relationship between institutions and adaptability in a cross-jurisdictional setting. One possible approach then, is to take an "instrumental" case study approach, meaning that a case is used to explore an issue of interest more deeply (Stake 1995).

<sup>&</sup>lt;sup>8</sup> In addition, a questionnaire focused on the eight dimensions of adaptability for this flood management system was administered to the same group of individuals. The results of this questionnaire are not expressly included in the study; however, this information did inform the author's understanding of the adaptability dimensions in situ and areas where perception of system adaptability performance differed and converged across classes of interviewees.

Yin (2003) suggests 3 conditions in which a case study strategy would be appropriate:

- 1. when "how" or "why" questions are being posed;
- 2. when the investigator has little control over events; and
- 3. when the focus is on a contemporary phenomenon within some real-life context (p. 1).

All three conditions are present in the current study, leading to the choice of a case study strategy to address the research problem.

The research problem lends itself to a qualitative approach for a number of reasons. Given that it is conceived of as a systems problem, the nature of this line of inquiry must be contextual. The exploratory nature of this research, due to the limited theorization in the literature at the time the study was designed, also supports the choice of qualitative methods (Creswell 1997). The theory of institutional adaptation for this type of context is still in the stage of working hypotheses; thus, a quantitative evaluation would provide less meaningful insights at this time. Furthermore, because the intention is not to establish cause-effect relationships, many quantitative approaches would be inappropriate. There is still a need to build understanding of the nature of this relationship, which may contribute to developing theory. Finally, the emphasis methodologically within the social-ecological systems literature to date has been on quantitative studies, reflecting the natural science basis of the field. Thus, a qualitative approach may yield different insights.

According to Stake (1995) "[m]ost researchers find they do their best work by being thoroughly prepared to concentrate on a few things, yet ready for unanticipated happenings that reveal the nature of the case" (p.55). Based on my position as a beginning researcher facing a complex systems research problem, the literature was drawn on at an early stage to guide the inquiry, while staying open to how the empirical details might challenge or enhance the ideas encountered there. The central interest of the study—to better understand the relationship between institutional arrangements and system adaptability in order to inform policy—required an ongoing iterative approach where the concepts and methodology were shaped by feedback from the case study along the way.

## 3.3 Choice Of Case

As this is an instrumental case study, the focus on institutional adaptability preceded the choice of a case. The issue of flood management was raised in the Fraser River Basin during the spring

freshet event of 2007 when forecasting indicated the possibility for record river levels. As resilience is recognizable when there is a shock to the system, this provided an event of interest because it tested the flood management system. A variety of considerations were made in order to choose a specific case within that context.

Since the research questions were posed in social-ecological system terms, the four levels of government needed to be interacting in a way that could be defined as a functional whole. Given the interest in institutions, this required a certain degree of interdependence and interaction between a municipal and First Nations community (or communities) on flood management issues. This case was identified as a possible focus due to the fact that a number of First Nations communities exist within the same geographical boundaries as the City of Chilliwack. Initial scoping of the case confirmed that, in addition to a geographic overlap, there was indeed a working relationship of some kind between these entities—an active "arena" to study.

A number of factors also suggested challenges to adaptability of the system. First, the political and social relationships between First Nations and non-First Nations groups in Canada are historically contentious and could be a significant barrier to adaptability of the SES. In this particular case, a number of Stó:lō communities are located completely outside of existing dikes that protect the City of Chilliwack. At the same time, Chilliwack had received significant funding from the province for structural upgrades to their dike system, and generally appeared to be well prepared to manage a potential flooding event. It was hypothesized that this contrast might be indicative of institutions that are not compatible with each other, resulting in lower potential adaptability of the system as a whole.

The most practical concern influencing the choice of a case was accessibility: a case was required that was close enough to Vancouver that multiple visits could be made to the area to conduct interviews and participant observation. Thus, while communities in the Skeena Valley were a more obvious choice because they actually experienced flooding during the 2007 freshet, a local case was the preferred option due to limited time and resources.

#### 3.3.1 Case Study Boundaries

Taking the unit of analysis as a social-ecological system, boundaries are defined along social, ecological and temporal dimensions. Together with the specific institutional dimensions, these define the "flood management regime" of focus.

#### Institutional

Disaster management, of which flood management is one type, is often depicted as a cycle that includes mitigation, preparation, response and recovery phases. In the current case study, aspects of mitigation, preparation and response are explored. Recovery was not relevant to the case study area, and thus is not addressed.

In British Columbia, the provincial government takes an "Integrated Flood Hazard Management" approach that aims to "reduce or prevent injury, human trauma and loss of life, and to minimize property damage during flooding events"<sup>9</sup>. This broad goal is addressed through three focus areas: dike safety, land use management and emergency management. An additional area of focus for many actors in the Fraser Basin is gravel removal. This study focuses on structural works (aka "dike safety") and emergency management only, and not gravel removal or land use management. This is principally because EM and SW were the main focus of action during freshet, and because they offer quite distinct institutional arrangements to explore and contrast. Gravel removal and land use management are critical pieces of the evolving institutional landscape of flood management in BC, and fertile ground for future study.

#### Social

The social dimension incorporates a combination of social, cultural, historical and political factors. Jurisdictionally, the federal, provincial, municipal and First Nations levels of government are related interdependently. Based on geographic and functional interdependence, the convenient starting place was with the City of Chilliwack and those First Nations communities within the same area. As the case developed, however, it became apparent that from the First Nations side the more relevant unit was the Stó:lō First Nations as a whole. Due to historical, familial, cultural and political factors, "institutions" correspond more with the unit of Stó:lō First Nations than with other boundaries that could be constructed. For example, various respondents reflected the notion that "we are all Stó:lō" (FNLG2), in the sense that cultural,

<sup>&</sup>lt;sup>9</sup> Accessed 5 April 2008 at <u>http://www.env.gov.bc.ca/wsd/public\_safety/flood/index.html</u>

historical and familial relationships extend across communities regardless of the particular political affiliations of those communities. Thus, the boundaries were adjusted to still focus on those communities within the same geographic area as Chilliwack (due to more direct functional interdependencies), while recognizing that there is another level of institutional interaction that corresponds more closely to the unit of Stó:lō First Nations.

#### Ecological

In terms of ecological boundaries, the unit of the Fraser River Basin is recognized as the unit of relevance to Fraser River flooding. A limitation of this study is that connections with other land uses—noticeably forestry—that influence the flood threat ecologically, were not explored.

#### Temporal

The case study covers the approximate period from January 2007 to November 2008. This is augmented by considering a longer-term context where required, in order to explore dimensions of institutional adaptability that are not captured within the immediate preparation and response phase of the freshet event in 2007.

#### 3.4 Ethics Protocol

In accordance with the University of British Columbia's stipulation that, "[a]ny research or study conducted at UBC facilities or by persons connected to the University involving human subjects in procedures that require potential invasions of privacy, must be reviewed and approved by the BREB," (UBC 2009) approval was received under certificate #H08-00236. This certificate is attached as Appendix A. Interviewees were asked to sign a consent form, which was reviewed and approved as part of the Behavioural Research Ethics Board process. This included a confidentiality agreement, which stipulated that interviewees would not be personally identified in the thesis report. For this reason, interviewees are identified according to the level of government they represent (or non-governmental agency where applicable) and whether they primarily serve First Nations communities (see section 3.6.1 for more details on interviewee classification).

#### 3.5 Role Of The Researcher

My position and perspectives as an individual influence the questions that I have asked, the information that I sought and perceived, and the interpretations that I have developed. My background includes training and interest in environmental studies and policy analysis, applied

at the provincial and national level. My research experience reflects these areas strongly, as well as my interest in First Nations in Canada and the relationship between First Nations communities and individuals and other levels of government. I favour qualitative approaches to research design and analysis as a means of reflecting the complexity of these types of problems. These perspectives have guided my inquiry, and attempts have also been made to verify my interpretations and assertions, as described in Section 3.7.2.

My aim originally was to engage in participatory research with communities, and base this research on more extensive field work. However, time and resources limited this pursuit. As well, not being physically located in the area limited my ability to form relationships and conduct interviews with a more representative set of key experts. In particular, I was not able to meet with, or interview, some central actors from Stó:lō communities that could have filled in a lot of gaps in my understanding of how institutions worked in practice. Still, I was welcomed into various forums and conversations in Stó:lō communities, Chilliwack and regionally.

## 3.6 Data Collection Procedures

### 3.6.1 Semi-Structured Interviews

The purpose of the semi-structured interviews was to identify "rules-in-use" in the flood management regime, and how these intergovernmental institutional arrangements impact the functioning of flood management for communities.

The initial inclusion criteria for interviewees were defined as:

- possesses knowledge of flood management/response in Canada, B.C., or the Fraser
   Valley, as it would apply to the communities of focus;
- possesses knowledge of flood response and management in the communities of focus, with an emphasis on actions in the spring of 2007;
- persons with this knowledge who are acting in a professional capacity; and
- persons that are engaged by, or involved with, local governments in flood response/management, in the communities of focus.

Appropriate organizations and their representatives were identified based on a review of publicly available information on the 2007 freshet and flood management and preparedness in British Columbia in general. They were also identified through others who work on flood management and response in the Fraser Basin and Chilliwack areas. An initial list of possible interviewees

was narrowed down based on the principle of selecting a smaller number of people who can provide the most information relevant to the defined case and research questions (Patton, 2002). In order to do this, I focused on people centrally involved in flood management for Stó:lō and Chilliwack communities, and key informants in other levels of government who are involved in intergovernmental processes mediating the different aspects of flood management. At a minimum this required an overall sample of people who 1) understand flood management in First Nations and Chilliwack communities; 2) have knowledge of structural works and/or emergency management; and 3) work with the most relevant local, regional, provincial and national organizations. An overview of interviewees is given in Table 1. The sample of informants was limited to those identified as having the greatest amount of direct knowledge of this case situation, given the boundaries described above in Section 3.3.1, and those that were available to participate.

Primary type	Scale of Organizational Responsibility				
of community served by Organization	Local	Regional	Provincial	National	
		Stó:lō leaders	FNESS staff	INAC staff	
First Nation		Emergency Management staff	MARR staff		
		FBC staff			
	Elected Official	FBC staff	PEP staff		
Municipal	City staff		MOE staff		
			EMBC staff		

 Table 1. Classes of Interviewees

In the text, interviewees are identified using the following descriptive labels:

NGA - Non-Governmental Agency

LG – Local level of government (community and regional governments) SG – Senior level of government (province-wide or national governments) FN<sup>10</sup>LG – Local level of government for First Nations communities FNSG – Senior level of government for First Nations communities

The twelve individuals interviewed included representatives from local, provincial and federal governments; two non-governmental agencies ("NGA") (First Nations Emergency Services Society and the Fraser Basin Council); Emergency Management ("EM"), General Flood Management, Gravel Removal and Diking professionals ("Other"); practitioners and decision-makers; and both Stó:lō First Nations and civic communities. For the purposes of comparative analysis, interviewees were classified according to their positions within institutional arrangements across the three categories displayed in Table 2.

#### Table 2. Categories of Respondents

Total	Principal Area of Flood Management		Serving a First Nation or Non-First Nation Population		Level of Government <sup>11</sup>		
Respondents	EM	Others	First Nation	Non-First Nation	Local level of govern ment	Senior level of govern ment	Non- government al agency
12	5	7	4	8	6	4	2

### 3.6.2 Direct Observation

In order to become familiarized with the individuals, organizations and institutions involved in flood management, a number of intergovernmental gatherings relating to flood management were attended following the freshet of 2007 (Table 3). These situations were invaluable for improving understanding of the case and who was involved in various capacities, making contacts with key participants, and developing rapport with some individuals who ultimately participated in the research.

<sup>&</sup>lt;sup>10</sup> The label of "FN" indicates an official working with a government agency whose primary function is in service of First Nations communities (the individual may or may not be a member of a First Nation).

<sup>&</sup>lt;sup>11</sup> "Local level of government" includes community and regional governments; "Senior level of government" includes provincial or national governments.

	Date	Host Organization	Purpose	Participants
Joint Program Committee meeting	September 2007	Fraser Basin Council	To discuss topics of business of the JPC, including ongoing studies and projects, sending a letter to the Premier of BC about long-term funding, and ideas for a Flood Forum	Representatives of local, provincial and federal agencies. Non- governmental and private stakeholders. First Nations and non- First Nations
Flood Forum 2008	January 2008	Fraser Basin Council	To share experiences and lessons learned from the freshet in 2007; to discuss innovative approaches, facilitate dialogue and consensus building, and to contribute to the a BC Flood Hazard Management Strategy	Representatives of local, provincial and federal agencies. Non- governmental and private stakeholders. First Nations and non- First Nations
Chehalis "mock emergency exercise"	March 2008	Chehalis First Nation	To do a full practice run of an emergency scenario (forest fire), to test the community's emergency plan and share the learning with other First Nations who attended	City of Chilliwack staff; FNESS; PEP; Chehalis staff and community volunteers; Other Stó:lō First Nations EM coordinators and leaders; External volunteer / NGO groups; Fraser Valley Regional District
Stó:lō Emergency Coordinat ors Meeting	October 2008	Stó:lō communities (held at Chehalis band office)	Update and coordination across communities and senior agencies	Stó:lō EC's, local FN councilors, FNESS staff, Chilliwack EM staff, INAC staff

## 3.6.3 Literature Review

Literature review was used to provide the academic and theoretical basis for the study (Chapter 2), and as an additional source of information about this specific case. For the latter purpose, case-specific reports, such as graduate research (Lapp 2005; Longland 2004; Lyle 2005), commissioned reports (NHC 2006; Arlington Group 2008; Blomquist et al. 2005) and historical material about Fraser Basin institutional arrangements (Dorcey 1991), were consulted.

Information captured in written documents of various forms was used as secondary data, and to verify details provided in interviews. Examples of documentation that was reviewed include:

- Media during the event
- Web-based materials
- Policies, laws and procedural guides
- Meeting minutes
- Reviews and studies

## 3.7 Data Analysis

## 3.7.1 Data Analysis Approach

Data analysis consisted of a qualitative analysis of interviews, field notes and documents. The data sources used as the basis of this analysis were transcripts of the 12 interviews conducted in the case study area; field notes from participant observation; and a range of documents and literature pertinent to the case. Analysis was aided by the use of the software "Atlas TI 5.2." Interviews were coded in stages. First, they were coded to identify decision-action processes that took place in the case study, and then according to categories and concepts in the IC framework. Having been grouped, they were then coded for themes, in order to identify patterns within the IC categories, and to contrast key patterns across subsystems. Coding for adaptability dynamics was done selectively along the way as IC coding was performed, and then systematically based on the identified contrasts across subsystems to identify key implications of those contrasts for adaptability.

The Institutional Capacity (IC) framework was used deductively, to lead from the descriptive account of the case into identification of significant institutional elements that contribute to the capacity for development and change in a system. Finally, key patterns and issues emerging from

the IC analysis were interpreted for their significance in terms of adaptability of the socialecological system. This final step is approached through the use of the eight features of adaptability identified from the literature.

#### 3.7.2 Methods For Verification

Qualitative researchers often assume a constructivist perspective on knowledge, which is to say that a given interpretation is not necessarily the only interpretation of the evidence, but is a feasible interpretation that could be arrived at by others (Stake 1995). This is the approach that was taken in analysis of this study, and applies to how my own interpretations were and those of the interviewees were considered. As the interviewees are professionals charged with making expert judgments on areas of flood management in the case study area, their views are taken as legitimate interpretations based in experience and expertise. In addition, multiple sources of information were sought to confirm and/or refute such interpretations. Specifically, the deliberate selection of interviewees was intended to provide differing views on institutional arrangements and multiple types and sources of data (interviews, documents, direct observation) were used for case description and verification of assertions.

## 3.8 Conclusion

From the general background and frameworks presented in Chapter 2, this chapter has detailed the ways in which abstract concepts were explored through concrete qualitative research techniques. This proceeded through a specific definition of the case study boundaries, and development of a set of data collection and analysis procedures aimed at identifying and relating institutional factors with adaptability dynamics. Chapter 4 will set the stage for the analysis to follow, with an overview of the institutional setting and components of the case.

# **Chapter 4: Institutional Profile**

This chapter provides the context underlying the analysis of Institutional Capacity for the case study area. Beginning with an introduction to the concept of disaster management and history of flood management in B.C. particularly, the profile then leads specifically into the formal institutional framework that forms the backdrop of the case study. The final sections introduce the main actors that were involved in intergovernmental coordination for flood management during the freshet of 2007, and outline some of the key dynamics across levels of government that derive from the constitutional division of powers in a Canadian context.

## 4.1 Disaster Management Phases

Disaster management, of which flood management is one type, is often depicted as a cycle that includes mitigation, preparation, response and recovery phases. The mitigation phase can include longer term processes of flood works construction, education and awareness building, land use management and changing practices for building construction. Preparation includes education and training, as well as actions in the lead-up to a possible disaster—e.g. urgent flood works such as rip rap or dike enhancements, and readiness actions such as preparation and exercising of emergency plans and response measures. Response is the acute phase of dealing with a disaster as it unfolds. In the case of flooding, this consists primarily of moving people and property out of harm's way and providing emergency social services. Recovery includes the distribution of insurance and support payments, rebuilding and debriefings. Aside from debriefings the recovery phase is not discussed, as this was not part of the experience in this case study region. For the purposes of this study, "Freshet" activities generally cover the preparation, response and recovery phase, while "Ongoing" activities generally fall within the mitigation phase.

## 4.2 History of Flood Management

Within flood management there are two main types of measures: structural and non-structural. In the Fraser Valley, as in many areas of the world, structural measures predominate (Lapp 2005, Lyle 2005). Especially in response to the floods of 1948, the diking system became a main focus of flood management and absorbed the lion's share of attention and resources. Beginning in the 1970's, following another close call with the freshet of 1972, governments began to pay more attention to non-structural dimensions of flood hazard management. This included land use planning measures and an ambitious floodplain mapping program enacted jointly by the federal

and provincial governments (Lapp 2005). Key developments and events in the history of flood management in BC are presented below in Figure 6.



Figure 5. Historical Timeline of Flood Management in the Fraser Basin

## 4.3 Actors

As depicted in Figure 7, a large number of agencies at every level of government (along with two non-governmental "boundary organizations") are involved in a variety of ways in directing flood management as it affects local or regional jurisdictions in B.C. Each agency is related in formal, and sometimes informal, ways to the decision-action processes that make up the practice of flood management in B.C. The main formal institutions linking these agencies to flood management are listed with each actor, and annotated descriptions are provided in Appendix C.

#### **Canadian Constitution**



Figure 6. Formal Institutional Arrangements for Flood Management in BC, from local to regional and national levels (see Appendix C for more detail)

The following descriptions provide an overview of the identity, roles, and responsibilities of each actor with respect to flood management.

## 4.3.1 City Of Chilliwack

At a basic level, any municipality in British Columbia is established with the purpose of:

- (a) providing for good government of its community;
- (b) providing for services, laws and other matters for community benefit;
- (c) providing for stewardship of the public assets of its community; and
- (d) fostering the economic, social and environmental well-being of its community.

(Community Charter, 2003)

Flood management is recognized as an important issue by staff and elected officials at the City. Ensuring that the community has a well understood and implementable emergency plan in place and continually working towards a dike system that will withstand a one-in-two-hundred-year flood event (including identification, prevention and repair of dike erosion) are the top priorities for flood management in Chilliwack (LG1<sup>12</sup>).

The City is the responsible "diking authority" for flood works within its boundaries. Structural flood works receive the lion's share of flood management resources, including almost \$4 million received for emergency upgrades leading up to the 2007 freshet. Chilliwack has an up-to-date and comprehensive emergency management plan, the "Fraser River Flood Response Plan," last updated in May 2007. The City also employs an Emergency Management Coordinator with extensive experience, including working with the First Nations Emergency Services Society (FNESS). The priorities of the emergency program are protection of life safety, protection of infrastructure, and enabling the City to rebound quickly following a disaster (LG3).

## 4.3.2 Stó:lō Communities

There are twenty-four Stó:lō communities in the Fraser River watershed and eight within the municipal boundaries of Chilliwack, each with their own priorities and approaches. The communities of Skwah, Shxwa:y and Squiala are completely unprotected by dikes, and often experience seasonal flooding.

<sup>&</sup>lt;sup>12</sup> Interviewees are identified by the type of organization using a basic distinction of local and senior government or non-governmental agency (LG, SG and NGA respectively), and specifying where the actor/organization expressly serves First Nations communities (FN), together with a number (1, 2, 3). The identification is consistent throughout the document. See section 3.6.1 for details of interviewee classification.

Communities are responsible for the health and safety of their members, and have the authority to plan and put laws in place similarly to a local government (FNSG1). In practice flood management is just one of many priorities and generally receives scant attention outside of times of crisis. Even where this may be a key concern for a community, funding and capacity is limited or non-existent (NGA1). For structural works communities may have an influence by lobbying INAC for funding, but generally these funds are allocated across B.C. according to risk-based criteria (FNSG1).

Many communities do not have emergency plans, and if they do the plan is often generic and not practised. In the case of the 2007 freshet, community preparations began between March and April 2007. Emergency coordinators were designated by some communities at that time, being pulled from their regular duties to be trained and, where possible, develop emergency response plans for their communities where nothing existed. An immense amount of work took place, primarily under the coordination of a community development worker for Stó:lō Nation who became the de facto Emergency Coordinator for the organization and other communities in the region (FNLG1)

## 4.3.3 Province Of British Columbia

In British Columbia, the provincial government officially takes an "Integrated Flood Hazard Management" (IFHM) approach. This broad goal is addressed through three focus areas: emergency management, dike safety and land use management. The following Ministries play key roles in the province's approach to flood management.

## 4.3.3.1 Ministry For Public Safety And The Solicitor General

The Ministry for Public Safety and the Solicitor General (MPSSG) is charged with maintaining and enhancing safety in the province. Their key portfolios relating to flood management are housed within Emergency Management BC: the Provincial Emergency Program, and the Flood Protection Program (established post-freshet).

#### **Provincial Emergency Program**

The Provincial Emergency Program (PEP) has as its mission, "to enhance public safety and reduce property and economic loss from actual or imminent emergencies or disasters by: mitigating the effects of emergencies and disasters through education and awareness; promoting

preparedness through planning, training and exercising; coordinating and assisting in response activities; developing and implementing recovery measures."<sup>13</sup> Its approach is guided by an "all-hazards" perspective and supported by an "Incident Command System" for response that is specific to the B.C. context (the B.C. Emergency Response Management System, BCERMS).

The approach fostered by BCERMS and the values of PEP is one of a supportive role to local authorities. Through an arrangement with INAC and FNESS, PEP is designated to provide emergency response services and administer disaster assistance to reserve communities. Notwithstanding, INAC retains ultimate authority for emergency management for First Nations communities.

In addition to its regular budget, PEP (through the Minister) may draw on additional funding from the consolidated revenue fund in the case of emergencies, and trained human resources from across the provincial civil service through the Temporary Emergency Assignment Management System (TEAMS).

#### **Flood Protection Program**

Following the freshet threat of 2007, the Premier of B.C. announced the installation of a new flood protection program administered by EMBC. The organization has no statutory authority of its own, rather it has a "mandate and a cheque book" (SG3). In addition to administering the new structural works funding of \$10 million/year over 10 years, EMBC is developing a strategic plan to bring the various components of flood management together under one system of governance, integrating the program across all levels of government (SG3). Their approach to this has been to begin with existing knowledge and structures around flood management. For example, the first rounds of funding have gone to "off-the shelf" plans for structural works as opposed to spending time up front to first complete a strategic plan. Likewise, development of the strategic plan is drawing on existing knowledge held by organizations such as the Fraser Basin Council and the Union of British Columbia Municipalities as a basis for a coordinated, strategic plan for the province (SG3).

<sup>&</sup>lt;sup>13</sup> <u>http://www.pep.bc.ca/Emerg\_Mgmt\_BC/Emerg\_Mgmt\_BC.html</u>, accessed 07/07/09

#### 4.3.3.2 **Ministry Of Environment**

The Integrated Flood Hazard Management program's goals are "to reduce or prevent injury, human trauma and loss of life, and to minimize property damage during flooding events"<sup>14</sup>. Within the Ministry of Environment (MOE), the Water Stewardship Division takes the lead on dike safety and land use management within the provincial government, as well as supporting emergency management and response.

## Flood Safety Section, and the Inspector of Dikes

The Flood Safety Section plays a lead role in flood management in the province, with the Inspector of Dikes maintaining the statutory authority for administering the Dike Maintenance Act, including issuance of construction and maintenance approvals for structural works. The section also plays a role in multijurisdictional river issues by sitting on committees.

Land use management, while recognized as "the most practical and cost effective way of reducing the flood threat to lives and property,"<sup>15</sup> has not made a tremendous impact on flood management in this province. An agreement between the federal and provincial government that had potential to significantly redirect floodplain development through restrictions on construction and withholding of disaster assistance for any new developments built in a designated floodplain, has not been backed up by necessary legislation at a provincial or local level. As a result, these programs have not changed the course of development in the Fraser River floodplain (Lyle 2005, Lapp 2005).

## **River Forecast Centre**

The River Forecast Centre (RFC) is a specialized agency that leads collection, quality control, analysis and archiving of snow data for the province. Through collection of snow, meteorological and streamflow data, the RFC issues warnings and forecasts that other authorities across the province rely on to inform their mitigation and emergency preparations<sup>16</sup>.

#### **Ministry Of Agriculture And Lands** 4.3.3.3

The Ministry of Agriculture and Lands (MAL) assists the agriculture, aquaculture and food sectors to increase economic development, achieve sustainability and deliver safe, high-quality

 <sup>&</sup>lt;sup>14</sup> http://www.env.gov.bc.ca/wsd/public\_safety/flood/index.html
 <sup>15</sup> http://www.env.gov.bc.ca/wsd/public\_safety/flood/landuse\_mgmt.html, Accessed 10/11/10

<sup>&</sup>lt;sup>16</sup> http://bcrfc.env.gov.bc.ca/, accessed 10/11/10

food. It also guides administration of Crown land (MAL 2006). MAL provides advice and coordination in the event of evacuation of livestock due to flooding.

## 4.3.3.4 Ministry Of Aboriginal Relations And Reconciliation

In addition to its ongoing role negotiating treaties and other agreements with First Nations in the province, the Ministry of Aboriginal Relations and Reconciliation (MARR) plays a leading and coordinating role across the provincial government with implementing the *New Relationship* and the *Transformative Change Accord*. These directions aim to bridge social and economic gaps between Aboriginal and non-Aboriginal people in B.C. through a holistic approach, and MARR provides support and advice across government to facilitate strong and respectful relationships with First Nations people. This means that the approach is less limited by jurisdictional boundaries, and more open to initiatives that will help to bridge that gap, regardless of where they are located (FNSG2). This is guided by principles of trust, recognition, and respect of Aboriginal rights and title that, ultimately, would be part of all engagement with First Nations.

This role is not specific to flood management, but has some implications in this domain. MARR is involved in cross-ministry coordination and advising PEP on aspects of First Nations relations with respect to flood management.

## 4.3.4 Tribal Councils

Tribal Councils are INAC-funded governance bodies with responsibility for delivering services to member communities in areas such as education, social and community development, child and family services, employment and economic development, health, fisheries, Aboriginal rights and title, treaty negotiations and language<sup>17</sup>. They also play a key role in lobbying and relationship-building with other levels of government to further the interests and needs of their people. In the Stó:lō region there are two Tribal Councils, the Stó:lō Nation Society and the Stó:lō Tribal Council, each representing and serving a collection of Stó:lō communities.

## 4.3.4.1 Stó:lō Nation Society

The Stó:lō Nation Society (SNS) is comprised of a Chiefs Council, Board of Directors and Staff. The eleven elected chiefs of the member communities sit on the Chiefs Council, with decisionmaking responsibility for the SNS. The vision of the SNS "encompasses the social, political, economic, and cultural development of the Stó:lō, as a nation. It is a vision of a First Nation's

<sup>&</sup>lt;sup>17</sup> http://www.stolotribalcouncil.ca/, accessed 07/04/08

attempt to collectively aspire for a better world for its people—the people of the river, in a manner that is governed by its distinct culture and traditions, where each and every Stó:lo individual will attain a decent quality of life and dignity"<sup>18</sup>

#### 4.3.4.2 Stó:lō Tribal Council

The Stó:lo Tribal Council (STC) operates according to a different governance model to the SNS, in that every member of the eight member bands is a member of the STC. This means that there are approximately 3000 eligible voting members who may also run in elections for a seat on the Board of Directors. On the Board of Directors, one seat is reserved for each of an elder and a youth representative. One of the differences between this governance structure and that of the SNS is that STC directors have to strike a "tricky balance. We have to be respectful of the authority and the responsibility of Chiefs and Councils. We can't undermine the elected Chief and Council of a particular band. But we have to be mindful that we also represent their members" (FNLG2).

The STC's mandate is to: "practice strong cultural values and rights, work together with Letsemot, and create a positive shared vision to improve our family and community wellbeing."<sup>19</sup>

Flood management concerns are mainly addressed through the intergovernmental relationships portfolio (including relationships with federal, provincial and other First Nation governments). While the directors' official responsibility is to their members, their approach on advocacy is not exclusive: "We're all Stó:lo, we're all related. So our job when we're advocating isn't just for 3000 Stó:lo members, it's for all 7000" (FNLG2). With respect to flood management, investment in infrastructure is a key priority, along with pushing for gravel removal (FNLG2).

## 4.3.5 First Nations Emergency Services Society

First Nations Emergency Services Society (FNESS) is a unique organization operating under the direction of a First Nations Board of Directors in service to First Nations communities. It began in 1986 with a focus on reducing the number of fire-related deaths on reserve, but in 1994 was

 <sup>&</sup>lt;sup>18</sup> <u>http://www.stolonation.bc.ca/</u>, accessed 07/04/08
 <sup>19</sup> <u>http://www.stolotribalcouncil.ca/</u>, accessed 20/03/10

established as a broader emergency services organization. Core funding is provided by INAC, to provide supportive services for INAC in FNESS's key areas of expertise<sup>20</sup>.

An agreement (MOU) between FNESS, INAC and PEP established a commitment to the same common goal of providing equivalent emergency preparedness and response support to onreserve communities as to other communities in B.C. The connections between FNESS and Stó:lō communities were still quite loose, by some accounts, as the organization was building its capacity to play a more connecting role between provincial and federal agencies and reserve communities during emergencies (LG3). They can assist where First Nation communities do not have effective working relationships with neighbouring municipalities. In line with the established system in BC, FNESS plays a supportive role to communities as opposed to assuming control in emergency situations.

## 4.3.6 Fraser Basin Council

The Fraser Basin Council (FBC) is a non-governmental organization that emerged out of a series of joint efforts to improve management in the Fraser River Basin and Estuary, now mandated "to bring people together to solve complex, multi-jurisdictional issues in the Fraser Basin, to take advantage of opportunities, and to strengthen the capacity of institutions and individuals to deal with emerging issues that threaten the overall sustainability of the Basin<sup>21</sup>. This organization brings together all four levels of government along with the private sector and civil society to work for sustainability of the Fraser Basin through a collaborative governance model, the first of its kind in Canada.

With respect to flooding, the Joint Program Committee (JPC) was formed within the FBC to be an ongoing forum for dialogue and specific initiatives around flooding. This forum is unique in that it takes a regional perspective that extends beyond the individual interests of its members, and supports those members to improve flood management. The FBC is in an interesting position in that it has no decision-making authority, and thus relies on other agencies to choose to deliver and implement the consensus developed at the JPC. The JPC's membership includes between 30 and 36 organizations that are engaged in regular meetings and joint projects.

http://www.fness.bc.ca/, accessed 07/05/08
 http://www.fraserbasin.bc.ca/about\_us/index.html, accessed 04/07/09

Funding for these projects is dependent on contributions of members through both annual fees and project-specific financial support.

## 4.3.7 Federal Government Of Canada

## 4.3.7.1 Indian And Northern Affairs Canada And INAC-BC Region

The general mandate of Indian and Northern Affairs Canada (INAC) is "to support First Nations, Inuit, Metis and Northerners in achieving their social and economic aspirations, thus developing healthy and sustainable communities where members enjoy a quality of life comparable to that of other Canadians"<sup>22</sup>. The INAC-BC region division's focus is on relationships, enhanced governance structures and providing tools and resources to First Nations communities<sup>23</sup>. INAC is legally responsible for ensuring health and safety on reserve, although this authority is delegated to Chief and Council when funding agreements are signed for provision of services on-reserve (FNSG1).

Aside from treaty negotiations, the federal government, primarily through the *Indian Act*, "has the responsibility to act in a fiduciary capacity with respect to aboriginal peoples. The relationship between the Government and aboriginals is trust-like, rather than adversarial, and contemporary recognition and affirmation of aboriginal rights must be defined in light of this historic relationship" (*R. v. Sparrow*, 1990). As the body primarily responsible for managing this responsibility, INAC's role is complex. Its functions with respect to First Nations include:

- negotiating comprehensive and specific land claims and self-government agreements on behalf of the federal government;
- overseeing implementation of settlements;
- promoting economic development;
- delivering "provincial-like" services (e.g. education, housing, community infrastructure, social assistance and social support services) with the goal of providing access to services that is comparable to what is available to other Canadians;
- fulfilling the Crown's lands, revenue and trusts obligations;
- matters relating to First Nations governance; and
- providing training initiatives.

<sup>&</sup>lt;sup>22</sup> http://www.ainc-inac.gc.ca/ai/mrr-eng.asp, accessed 09/07/09

<sup>&</sup>lt;sup>23</sup> <u>http://www.ainc-inac.gc.ca/bc/whho/wkptsh/wkptsh\_e.html</u>, accessed 09/07/09

It works largely in partnership with First Nations, who administer around 85% of INAC's funding, and describes its role as increasingly one of a facilitator between First Nations and "interests" (INAC 2007a). Other descriptions of INAC's functioning are less judicious, for example this quote from the National Chief of the Assembly of First Nations, Phil Fontaine, in April 2000: "DIAND, like the Government of Canada itself, suffers from a schizophrenic personality. It holds and administers fiduciary obligations to our peoples at the same time as it must observe its political obligations to the rest of Canada. ... It advocates one moment on our behalf and in the next moment, through the Justice Department, against us" (quoted in Hurley, 2000).

In the INAC-BC Region, \$3 million/year has been designated for floodworks projects in B.C., and this has been ongoing since. The office has estimated that \$230 million is required to clear the backlog of erosion or flood works projects currently. Need is assessed using risk-based criteria, and as a community's project arrives at the top of the list, they may access funds to design and construct the required floodworks.

The INAC-BC Region has highlighted Emergency Management planning as one of its key strategic priorities for 2007 – 2010. Its stated objective is to "provide coordinated emergency management assistance and resources to First Nations in partnership with the Province of BC," which will be measured by the number of First Nations with Emergency Response Plans (INAC-BC 2007). This measure is included within the health portfolio for First Nations already (FNLG1); however, it has not generally been funded or enforced (NGA1, FNLG1).

#### 4.3.7.2 Public Safety Canada

Public Safety Canada (PSC) is the lead agency for public safety for the Government of Canada. Its functions span from policing, law enforcement and community safety, to the combined branch of emergency management and national security. The latter office provides support to provincial and territorial governments through education, training, funding and exercises. It is also charged with crafting emergency management policy and providing analysis, warning and response. Its overall mandate is "to keep Canadians safe from a range of risks such as natural disasters, crime and terrorism"<sup>24</sup>.

<sup>&</sup>lt;sup>24</sup> http://www.publicsafety.gc.ca/index-eng.aspx, accessed 10/11/10

## 4.3.7.3 Infrastructure Canada

Infrastructure Canada (IC) works to "provide a focal point for the Government of Canada on infrastructure issues and programs through the Building Canada plan; lead the Government of Canada's efforts in addressing the infrastructure challenges of the country; support infrastructure initiatives across the country; and facilitate world-class public infrastructure for Canada and Canadians"<sup>25</sup>. It is newly implicated in floodworks in B.C. through the "Building Canada" fund and an associated agreement with the province of B.C. to make this funding available for structural works. In the recent past, floodworks did not qualify for federal infrastructure funding.

## 4.3.7.4 Department Of Fisheries And Oceans

The Department of Fisheries and Oceans (DFO) is broadly "responsible for developing and implementing policies and programs in support of Canada's scientific, ecological, social and economic interests in oceans and fresh waters"<sup>26</sup>. It administers the federal Fisheries Act, and as such has responsibility for fisheries, fish habitat and aquaculture. Accordingly, it is involved in flood management where structures or activities occur within waterways—for example if rip rap or dikes extend into the water, or where parties wish to remove gravel from the river channel. As a regulatory agency, its relationship with other levels of government and project proponents plays out through the approvals process.

### 4.3.7.5 Canadian Forces

The Canadian Forces (CF) is organized into four "commands" to enhance efficiency and responsiveness. Canada Command is the branch that provides support to Canadian law enforcement and civil authorities, for example during a disaster event<sup>27</sup>. Some players involved in the freshet response found a discord at times, between the "command-and-control" approach of the Canadian Forces and the supportive structure of the BCERMS approach that is practiced in B.C. (LG3, SG1). However, while in the past the CF did not often get involved in emergency preparation but arrived to aid in response or recovery, during freshet 2007 they got involved in the advanced planning stages and "became kind of a cohesive linked unit" with PEP's system (SG1).

<sup>&</sup>lt;sup>25</sup> http://www.infc.gc.ca/infc-eng.html, accessed 06/07/09

<sup>&</sup>lt;sup>26</sup> http://www.dfo-mpo.gc.ca/us-nous/vision-eng.htm, accessed 07/07/09

<sup>&</sup>lt;sup>27</sup> http://www.forces.gc.ca/site/acf-apfc/index-eng.asp, accessed 07/07/09

### 4.4 Constitutional Division Of Powers

#### 4.4.1 Local And Senior Levels of Government In Canada

At the senior level, Sections 92 and 93 of the Canadian Constitution define the exclusive jurisdictions (i.e. legislative authority) of the provinces, including education, health, natural resource and land management, municipal entities, direct taxation for provincial purposes, and local works (*Constitution Act*, 1867). The federal government retains jurisdiction over issues such as trade, criminal law, the military, fisheries, and Aboriginal people and reserve lands, as defined in Section 91. As a result of this separation, "municipal institutions" are within the exclusive purvey of the province; in general, local governments only have the power to do that which provincial legislation directly allows them to do (UBCM Advisory Service 2006a). They are, in effect, a creation of the province and their ability to act is directly defined in legislation by the province. In Canada this designated responsibility for municipalities is guarded by the provinces, resulting in little opportunity for direct federal-municipal cooperation. For example, most federal grants that are used by municipalities (other than those paid directly to municipalities in lieu of property taxes) are delivered through provincial-federal agreements and/or municipal-provincial-federal agreements for infrastructure funding (Dewing et al. 2006). Likewise, First Nations communities governed by the Indian Act are a creation of the federal government, who determine their powers and functioning. Provincial laws do not apply to federal lands, including reserve lands.

Aside from the division of legislative powers between the federal and provincial governments, there are also fiscal implications deriving from the Constitution. In general, the federal government tends to have a greater fiscal capacity than provinces. Nonetheless, a trend of "downloading" (directly or indirectly passing responsibilities on to lower levels of government without the transfer of additional financial capacity) from the federal to provincial level, and provincial to municipal level since the 1980s in Canada has put increasing pressure on municipal governments to deliver services previously provided by senior levels of government (Dewing et al. 2006). Revenue sources for municipalities are restricted to property taxes, charging for services, and grants provided by other levels of government (UBCM Advisory Service 2006b). They are also not legally allowed to run a deficit, unlike the provincial and federal governments (UBCM Advisory Service 2006c). While the major share of revenue for local governments comes from property taxes, reserve communities typically receive most of their funding from the federal governments that outline the conditions of that funding

(FNSG1). Powers are thereby delegated to the community's leadership in areas such as health and safety, and community planning; however, and similar to the situation for non-First Nations communities, funding and/or local capacity may not be sufficient to adequately address downloaded responsibilities.

## 4.4.2 Context Of First Nations And Non-First Nations Community Capacity In Canada

In addition to these areas of similarity across local First Nation and non-First Nation communities with respect to their relationship with senior levels of government, there are important differences in the institutional contexts.

A key institutional factor for First Nation community capacity is the fact that the Government of Canada is the landowner for reserve lands, with powers over use of those lands detailed in the Indian Act and interpreted through the courts over time. One of the direct implications of this is that the local community cannot enter into agreements with third parties to enter reserve land— that authority remains with the Crown. So although it is accepted practice for the local Chief and Council to issue a Band Council Resolution to give permission for the Forest Service to enter reserve land during an emergency response, the legal authority (and therefore duty) remains with the Government of Canada. This relationship is tempered in part by the GoC's "fiduciary duty" towards First Nations people and communities, which binds the GoC to act in best interests of the community, for example to get the best possible deal if land is sold. There are also areas where the Indian Act allows for delegation of authority to local Band Councils to create bylaws providing for health of its residents, zoning, and maintenance and construction of local works, for example (Indian Act, 1985). Some of these responsibilities may be directly passed to Councils as part of contractual funding agreements between INAC and communities, for example for provision of health and safety for residents.

From Canada's beginning in 1876, the relationship between the Government of Canada, through INAC, was one of dominance and assimilation, as described in the RCAP 1996. This has had the effect of undermining much of the institutional capacity that had existed in First Nations, and will take time and investment to rebuild (RCAP, 1996). The Indian Act itself perpetuates a paternalistic relationship between the Government and First Nations people and communities to this day. While it gives authority for establishing bylaws and revenue streams with one hand, it maintains control and ownership, and the ability to withdraw authorities that have been given,

with the other (Indian Act, 1985). This is one of the dimensions of what has been called INAC's schizophrenic relationship towards First Nations people (Grand Chief Phil Fontaine, quoted in Hurley 2000). Compounding the institutional basis for dependence and underdeveloped local capacity, is the fact that reserve lands were designated by the Government of Canada, often in places that would not have been chosen as permanent settlements due to undesirable qualities such as frequent flooding (NGA1). So although communities were not given a choice about where they would be located, they are now faced with providing for the health and safety of residents in sometimes hazardous locations.

This is not to say that local communities are unable to deal with the challenge: there are many examples of institutional and economic development, leadership and innovative land management among Stó:lō communities. And though it may be slow in coming, there are indications of an ongoing cultural shift within INAC (FNSG1, NGA1) towards some of the principles put forward in the 1996 Royal Commission on Aboriginal Peoples such as recognition, respect, sharing and responsibility.

Designation of reserve lands did not erase historical and cultural affiliations of Stó:lō people, and the family networks and cultural ties are still a significant element of the region's institutional capacity. For example, although regional governance for the Stó:lō is divided between two distinct political bodies (Stó:lō Nation Society and the Stó:lō Tribal Council), each of these bodies chose to act in the interests of all Stó:lō people during the freshet, regardless of their political affiliations. In addition to those ties, since historical times Stó:lō people have practiced a system of Siyam governance, which now exists alongside the bureaucratic Chief and Council system. New forms of governance such as the Stó:lō Tribal Council model, combine aspects of the Siyam system while incorporating other elements more akin to other Canadian governance models. Traditional practices can be an important part of the governance system; for example, the STC recognized early in its existence that meeting in a longhouse, or pairing council meetings with cultural or spiritual ceremony, was likely to draw a large contingent of members, whereas a meeting in a hotel ballroom would not (FNLG2). Beyond the legal framework for governance, the culture of governance practiced by Stó:lō differs in certain respects from that of the City of Chilliwack or other levels of Canadian governments.

Between the sometimes contradictory institutional framework surrounding INAC-community relations, and the differences in governance culture across various communities and levels of governance, it is not surprising that there is a complex relationship between INAC and local political bodies. Local leadership may appear in support of INAC in one circumstance, and in staunch opposition in another.

## 4.5 Conclusion

The institutional profile presented in this chapter began by setting the general context of disaster management and the history of flood management in this region, moving through the specific actors and some central relationships between them as a result of their respective identities, roles, responsibilities and histories. The next step in the process is to consider how these basic pieces give rise to different capacities for response, development and change in the institutional system. This is the subject of the following chapter.

# **Chapter 5: Institutional Capacity Analysis**

## 5.1. Introduction

Chapter 4 provides an outline of the institutional framework relevant to this case. This chapter moves into a specific analysis that examines the ways that Institutional Capacity (IC) was drawn on, and is developing, to enable change and development of that flood management regime.

The flood management regime is separated into sub-systems for ease of analysis along a number of lines. The systems in operation during freshet times, as compared to ongoing situations, are very distinct from one another. This is a natural distinction. As well, the emergency management and structural works sub-systems of flood management consist of different sets of actors, operate at different time scales and under different authority and resource allocation structures. While they overlap in certain circumstances, these two functions are quite distinct. Comparisons are drawn along these two lines (Emergency Management vs Structural Works, and Freshet vs Ongoing). As discussed in Chapter 4, within these sub-sections of the flood management system there are two important implications of the constitutionally-defined governance system in Canada. That is, the distinction between Local and Senior levels of government, and the differences in governance for First Nations and non-First Nations communities. Comparisons will also be drawn along these lines.

IC is conceived of in terms of three interrelated components: Relational Resources, Knowledge Resources and Mobilization Capacity. Each of these components is explored in this chapter through drawing comparisons across the four sub-systems of the flood management regime. Finally, the three components are drawn together to provide a summary of IC issues by subsystem.

## 5.1.1 Network Diagrams

Diagrams accompanying the following discussion represent the key institutional relationships among flood management actors in the case study context. Each diagram is built of a base layer containing all of the potential governmental or boundary actors, as shown in Figure 8, and presents the key relationships occurring for a particular freshet or ongoing situation. Actors are roughly organized with federal government agencies at the top, provincial to the right,  $Stó:l\bar{o}$  government to the lower left and Chilliwack in the centre<sup>28</sup>.



Figure 7. Flood Management Actors presented as a base map for institutional relationships.

Relationships are represented in the diagrams by lines connecting particular actors, or shaded areas that represent broader "coordinating spaces". Types of relationships are distinguished by the colour of the lines, their directionality and consistency, as detailed in Figure 9.

<sup>&</sup>lt;sup>28</sup> This layout has no significance, it was chosen for clarity and ease of presenting relationships among actors.





A "coordinating space" signifies an arena, such as regular meetings or a committee, where members have the opportunity to regularly interact. As such, it automatically includes relationships of "information," "coordination" and general "support." Thus, the shaded box for each coordinating space is used in place of blue, red and brown arrows. Where these arrows are added on top of a coordinating space, there are additional relationships between specific actors that are not shared by others simply by being a member of the coordinating space. For example, over and above their common membership as part of the BC Government's Central Coordination Group, PEP and the MOE have a direct working relationship in coordinating flood preparation and response for the province (indicated by a solid red line in Figure 10). The coordinating spaces included in the diagrams below are:

- 1. City of Chilliwack's freshet Emergency Planning Committee
- The South West Provincial Regional Emergency Operations Centre (SW PreOC), run by PEP
- 3. The BC Government's Central Coordinating Group

- The Memorandum of Understanding Arrangement between INAC, PEP, FNESS and Stó:lō communities
- 5. Stó:lō Community and Emergency Planning Networks
- 6. PEP's ongoing Emergency Management coordination
- 7. City of Chilliwack's ongoing Emergency Management Committee

Two significant positions in the institutional arrangements are "nodes" and "switching points". Nodes refer to actors that are a central location for exchange (of information, authority, access, resources, etc) within a group or level (e.g. a central point for organizations serving First Nations communities, for local governance, or at the provincial level). Switching points are nodes that cross levels or groups. In other words, they create new pathways for coordination, organization and exchange across groups that do not normally have contact or strong working relationships. The clearest example of a switching point is PEP, which is the agency charged with coordinating organizations and agencies (across levels) during emergencies. Nodes and switching points will vary by context. For example, the City of Chilliwack is classified as a switching point during the Preparedness and Readiness phase (Figure 10), but as a node for Emergency Structural Works (Figure 13).

The main source of data for the analysis in this chapter is the set of 12 expert interviews. Particularly in Section 5.2, *Relational Resources*, this information was verified and extended through the use of public and internal documents that specify formal institutional arrangements, roles, responsibilities and routines.

## 5.2 Relational Resources

The category of "Relational Resources" draws attention to the networks of consequence to actors, and specifically how their membership, structure, integration and consequent creation of social capital and relationships to power can be drawn upon or developed by actors involved in the flood management system. To explore this element of Institutional Capital, network diagrams<sup>29</sup> for the emergency management and structural works functions during freshet and ongoing situations are used to illustrate the four dimensions of RR (Table 4). All ten diagrams are presented a second time in side-by-side layout on pages 92 – 93, for ease of comparison for the reader. This is followed by a comparison across the subgroups within flood management to

<sup>&</sup>lt;sup>29</sup> All eight network diagrams are provided at relevant points in the text, as well as on pages 85 and 86 for easy reference and comparison

identify key issues. This section is substantially longer than subsequent sections, as it provides context for the analysis of Knowledge Resources (section 5.3) and Mobilization Capacity (section 5.4).

Relational Resources	RANGE: The range of stakeholders involved, in relation to the potential universe of stakeholders in the issue or in what goes on in an area
	MORPHOLOGY: The morphology of their social networks, in terms of the density (or "thickness") of network interconnections, and their "route structure"
	INTEGRATION: The extent of integration of the various networks
	POWER TO ACT: The location of the power to act, the relations of power between actors and the interaction with wider authoritative, allocative and ideological structuring forces

 Table 4. Dimensions of Relational Resources (adapted from Healey et al., 2003)

## 5.2.1 Range And Morphology: Freshet Functions

Disaster management is broken down into four main phases (Section 4.1). In the freshet preparation stage for EM, there is a high level of common membership in networks and ongoing interaction across most actors in the system, depicted in a single diagram (Figure 10). During the response stage, these networks disengage in certain respects, as actions become focused at a local level; thus, separate network diagrams are presented for Stó:lō communities (Figure 11), and City of Chilliwack (Figure 12). The connections and relationships are still present to draw on as needed, but immediate action is more focused. SW is connected to these preparation activities, but in other ways it acts separately—this is presented in its own diagram (Figure 13). As depicted in Figure 10, most flood management actors are involved in freshet preparations; however, some play central roles while others are very peripheral. The key actors during preparation are PEP, City of Chilliwack Emergency Management (CoC EM), INAC, Stó:lō Communities, and the Stó:lō Emergency Coordinator (Stó:lō EC).



Figure 9. Preparedness and Readiness Phase: Emergency Management



Figure 10. Readiness and Response Phase: Stó:lō Communities


Figure 11. Readiness and Response Phase: City of Chilliwack

As the central coordinator of emergency response for the province, PEP principally takes the place of a "hub" in a hub-spoke formation across agencies and levels of government during the preparation phase. Funding, support and information are channelled through PEP for the majority of actors. During the response phase, this structure shifts somewhat: while PEP is still available as a central node, response functions are organized into a hybrid of network and hierarchical structure according to the BCERMS system. The CoC EM is at the end of a spoke relative to provincial coordination, but is a central node at a local-regional level. The emergency planning committee (Figure 12, #1) formed by the CoC EM is the central organizing structure at a local level, and is open to all interested local, regional, provincial and federal actors (governmental and non-governmental).

Major networks for preparation and response are coordinated by PEP, or local actors. The Central Coordinating Group (CCG) (Figure 10, #3), is a high-level coordination group internal to the provincial government (e.g. Assistant Deputy and Deputy Ministers) with direct lines to decision-making power. INAC was invited to participate in this forum. The SW PreOC (Figure 10, #2) and the advanced planning unit established therein, extend PEP's coordinating role (at an operational level) to all flood management actors and serves as a physical point of contact among actors, a source of technical capacity, and a repository and distribution centre for information. INAC plays a similar role to PEP, leading provincial coordination in support of First Nations communities, but the structure of its networks are different. One of the key structuring elements is the MOU with FNESS and PEP (Figure 10, #4), which defines specific roles and responsibilities of each.

The Stó:lō Emergency Coordinator (Stó:lō EC) plays a central role in preparations for the Stó:lō region, acting as a liaison, spokesperson and hub for information and coordination between some communities and between communities and local/regional and provincial activities. During the 2007 freshet, different communities varied in how tightly tied to the provincial system or CoC-led preparations they chose to be, and in their degree of involvement in Stó:lō-led preparation and training. Communities are already tied through family and cultural connections throughout the Stó:lō territory, and this serves important functions during preparation and response (Figure 11, #5).

During freshet preparations, emergency construction, maintenance and upgrading of dikes is again focused around five or so main actors, but works for the City of Chilliwack are entirely distinct from those planned and executed for Stó:lō communities.(Figure 13). The key actors involved in emergency structural works are the City of Chilliwack (Engineering), Stó:lō communities, Ministry of Environment (Inspector of Dikes), Emergency Management BC, and INAC.



Figure 12. Preparedness and Readiness Phase: Emergency Structural Works

The central "corridor" relationship governing structural works for CoC during freshet is between their Engineering department and the MOE. As depicted in Figure 13, the two actors are connected densely and on both the approval and funding sides of the equation. A link also exists to MOE and EMBC in their joint administration of requests for funding for emergency structural works during this event. Approvals are required from DFO in certain cases. The only link to Stó:lō communities comes up around maintenance of the cross-jurisdictional dike, which crosses reserve land of the Skwah First Nation and Shxwa:y Village. An agreement signed with Shxwa:y allows a trespass by CoC to maintain that section of the dike. But permission to carry out maintenance or upgrades is still withheld by Skwah First Nation.

Unlike EM, where funding is available via PEP for all qualifying activities by Stó:lō communities, funding for structural works during freshet comes through the discretion of INAC directly (or indirectly, via FNESS). INAC and FNESS coordinate and combine their staff resources to gather field intelligence and support or manage construction and maintenance of approved works in communities across BC. INAC-FNESS holds the power to fund projects, and in many cases also manages projects. In addition, decisions are made strategically for the province as a whole, and as such are less driven by initiatives at the local level. DFO approval would be required in certain cases.

To recap, the EM system exhibits a web-like structure across actors and levels during freshet times, with the focal node of activity shifting from PEP during preparation, to CoC and Stó:lō communities during response. INAC plays a similar role to PEP for EM functions, structured through the MOU which enables approximately equivalent treatment of CoC and Stó:lō communities in the system. Structural Works operates by a different chain of command, particularly where funding is concerned. The structure of relationships is distinct for CoC and Stó:lō communities. Funding, information and decision-making functions are separate for CoC and Stó:lō communities.

### 5.2.2 Range And Morphology: Ongoing Functions

The networks and connections between actors for ongoing EM are similar in structure to what exists during freshet, but less dense or consistent (Figure 14). More links are conditional (applying in certain situations, at certain times, or by discretion). While there are some clear

positions due to the distribution of authority, route structure appears as a web in most cases. Aside from INAC's involvement, connections to federal actors are weak and rare, with the exception of funding provided through the JEPP program<sup>30</sup> (accessible to CoC and Stó:lō communities). Key actors in ongoing EM in 2007-8 are CoC, Stó:lō communities and Stó:lō EC, EMBC/PEP, INAC and FNESS.



Figure 13. Ongoing Emergency Management

CoC's ongoing emergency management committee meetings (Figure 14, #7) are the central focus of connections. This provides a regular coordination link to one or more Stó:lō community representatives and any other actors who regularly participate (the forum is open to broad involvement). The formally hierarchical position of PEP with respect to local governments as outlined in the Emergency Program Act is translated in practice to more of an enabling than an enforcement relationship. They organize seasonal conference calls with EM actors, carry out periodic updates with MOE on flood preparedness, and coordinate in various ways with INAC (Figure 14, #6). In this way, while PEP is still in a central position in the province, connections are more similar to a web than hierarchy.

An emerging emergency management network across Stó:lō communities (Figure 14, #5) with links to actors through #6 and #7 in Figure 14 forms the backbone of ongoing emergency management actions in 2007-8. This network serves as a forum for mutual learning across Stó:lō

<sup>&</sup>lt;sup>30</sup> See Appendix C "Formal Rules" for a description

communities, and as a way to bring a broad range of supporting actors together to share information and identify ways to access resources, training and other support. Two-way relationships were developing in terms of information exchange with other networks, and coordination with CoC. Links to PEP, FNESS and INAC for ongoing emergency management exist, but are weaker than during freshet time.

In the first two scenarios for structural works—where a Stó:lō community (Figure 15) or CoC (Figure 16) are engaged in a structural works project entirely within their own jurisdiction—the set of connections is compact, mainly between two actors (CoC-MOE/IOD, or Stó:lō community-INAC). But in the scenario where a structural works project crosses jurisdictions (Figure 17), the network structure begins to take on more of a web shape, as influence becomes more distributed and a number of new links enter the picture. FBC is not viewed as a central actor on structural works, but ongoing work of the Joint Program Committee contributes to the evolving politics and discourse around structural works for the entire Fraser Basin and to the technical background used for dike design. The key actors are CoC Engineering, MOE/IOD, EMBC, Stó:lō community, and INAC.





Figure 15 only exists once INAC decides that a community will receive funding in that budget year (according to INAC's ranking system). In the case that a Stó:lō community was to build a dike, the community takes on a role of project manager vis a vis the boss/owner role of INAC. These relative positions derive from the fact that the Government of Canada is landowner on reserve, and the associated fiduciary duty towards First Nations. In addition, the province is

legally restricted from using provincial tax dollars for structural works on reserve. The degree of dominance may be less where it's a larger band that has capacity to manage the project itself, but release of funding, and final approvals still rest exclusively with INAC.

In the CoC structural works scenario (Figure 16), CoC Engineering is the driver, with MOE and EMBC playing a gatekeeper role to some extent. MOE/IOD are also involved with technical support and dialogue about plans as they are receiving approval. Both federal and provincial sources of funding are funneled through EMBC. This simplifies connections in one respect, but also means that communities are restricted in potential uses of that funding along criteria set by the federal government. DFO fulfills a specific purpose but is perceived as being removed from the set of actors in BC.



Figure 15. City of Chilliwack Dike Construction



Figure 16. Cross-Jurisdictional Dike Construction

The network structure for cross-jurisdictional structural works projects starts to shift into something more web-like (Figure 17). Redefinition of the appropriate (and legally-mandated) relationship (i.e. under the *New Relationship* policy, and due to court decisions) between senior levels of government and First Nations communities is leading to new connections being drawn that have the potential to shift access to power and resources. Whereas in the Stó:lō community scenario INAC is the central actor, cross-jurisdictional conditions may open up some strategic opportunities for Stó:lō communities to have greater influence.

### 5.2.3 Integration

Having outlined the structure and characteristics of networks across the flood management system, the category of "Integration" looks at the extent of, and approaches to, integration across networks as a further component of Relational Resources.

In the EM system, horizontal integration (within local or senior level) is occurring through formal and informal means. At a local level, the sharing of capacity and resources and hosting of emergency preparation meetings by both the City of Chilliwack and various Stó:lō communities suggests more of a two-way integration, in spite of CoC's larger organizational capacity. The relationship between INAC and PEP is perhaps the most consequential at a senior level. Coming from two distinct jurisdictional levels and having responsibilities for distinct groups within BC, there is a wider gap to bridge. Nonetheless, the relationship has been described as "stellar" (FNSG1) and demonstrates an active process of integration that is quite unique. Vertically, across local and senior levels of government there is a high degree of procedural integration during freshet, along with direct relationships to enable decision-making and coordination in stressful circumstances. One of the connections that was new to Stó:lō communities was being directly involved in PEP-led forums such as the SW PreOC and advanced planning, along with training and ESS support.

The independent effort at both a local level and a senior level, to integrate across FN and non-FN actors, also enhances integration or capacity at other levels—a sort of "diagonal" integration. The cooperation between the City of Chilliwack and Stó:lō communities allows PEP to focus on other communities that may need more support:

...we know that Chilliwack and the First Nations communities are linked at the hip. They are planning together so that if there is a reception center that needs to be opened up... we don't have to go in and sort of put in a backdoor plan in place with INAC on how are we going to deal with the Stolo communities... The advanced planning that was happening in the local communities, every meeting that I had the opportunity to attend, First Nations were there at the planning table. Whereas I'm not sure that that was always the case. But that is definitely the case now. (SG1)

At the same time, the stronger integration between PEP and INAC creates pathways for Stó:lō communities to access the provincial system. In effect, integration at each level reinforces capacity at the other level, enhancing capacity for the system overall.

There is not much evidence of integration in the SW system during freshet preparation, which is visible in the network diagrams (Figure 13). In the BC system, there is no comprehensive perspective on structural works projects, but there is at the INAC-BC level. These sides of structural works management are not coordinated and typically are not in communication with one another. The City of Chilliwack proposes and receives funding for plans of their own design that are not coordinated across communities. For Stó:lō communities, decisions and funding for emergency structural works are handed down from INAC, aside from exceptional circumstances where businesses located on-reserve choose to carry out structural works projects. The sense of diagonal integration across First Nations and non-First Nations systems that is seen in EM is not present for emergency SW.

For the most part, processes around structural works are self-contained and separate. The one area where there is movement towards greater integration across systems is where new relationships are forming to deal with areas of interdependence. There is an active effort to build capacity for cooperation and ongoing joint decision-making in the case study area. The situation around the Skwah dike exemplifies this, providing an example where both systems must come to some reconciliation to move forward in both parties' interests. "Chilliwack and these Bands ultimately need to work together to hopefully solve some of the problems that they have together" (SG2) Importantly, this also pulls INAC into the discussion, as commitment of funds by CoC and/or the province may influence Skwah's placement in INAC's ranked list for funding (FNSG1). This is akin to the "diagonal integration" described for EM during freshet.

Within each of the CoC and Stó:lō dike scenarios, relationships with DFO are a notable instance of division. This is one necessary and important branch of the approvals process housed at the federal level, and is not perceived as being integrated into the BC context "To the federal government, we are almost nonexistent" (LG2). The generally contradictory nature of mandates for the MOE and DFO is a potential flashpoint for conflict in the process.

### 5.2.4 Location Of Power To Act

The BCERMS system is designed to distribute the power to act to where it needs to be for effective response in an emergency. There are multiple "lead" actors in emergency management, from PEP and MOE at the provincial level, to CoC and Stó:lō communities at a local level. The BCERMS system and BC Flood Plan that is based on this, clearly detail roles and responsibilities and enable information sharing. This is tied to legal obligations spelled out in provincial legislation that binds communities to prepare and be equipped to respond to emergencies. This obligation is supported by direct access to resources and to strategic support at higher levels of organization. For emergency structural works, access to funding and authority are of primary importance. In contrast to the distributed and enabling approach seen in emergency management, in emergency structural works the key senior level actors play gatekeeper roles. The DFO and MOE are checkpoints for approvals, while INAC and EMBC-MOE hold the purse strings. This distinctly separates the power to act from the local level.

By and large, the funds for emergency structural works come from senior levels of government for both Stó:lō communities and the City of Chilliwack. But CoC can, if necessary, take action to

do emergency upgrades prior to funding confirmation from senior levels of government (based on an expectation that they will be reimbursed). Stó:lō communities do not have this assurance. Lacking resources, authority, and financial tools at a local level, there is little ability to organize locally to shift the location of the power to act on the short timescale of a freshet preparation, unlike what happened in the EM system.

The City of Chillwack and PEP receive their authority and obligations with respect to ongoing emergency management, from the *Emergency Planning Act* legislated by the province of B.C. This legislation provides the ability and imperative for local authorities and PEP to develop and maintain emergency programs, and fund this activity. Despite the fact that PEP has the power to require municipalities to fulfill duties according to the *Emergency Planning Act*, they execute their responsibilities through education, support and encouragement rather than punishment or strict regulatory authority. Both of these actors develop their power to act through ongoing collaboration and cooperation with broad networks.

Stó:lō communities, or the STC and SNS, receive core funding for functions such as planning, but in practice very few have found ways to prioritize EM. Funding does not come strictly designated for EM, and there is no equivalent to provincial *Emergency Planning Act* for reserve communities. However, the recent passage of the *Emergency Management Act* into law at a federal level may make this a more explicit priority from INAC's perspective. As well, the experience of preparing for the freshet built a significant level of human capital and capacity within the network of Stó:lō communities. Those communities and individuals moving ahead with developing this system are serving as resources to others.

# FRESHET







The following sections (5.2.5 - 5.2.8) summarize and compare the four dimensions of Relational Resources discussed above (Range, Morphology, Integration, Location of the Power to Act) across subgroups to highlight dynamics of significance in the flood management system.

#### 5.2.5 Local Vs Senior Levels Of Government

The basic distinction that sets senior levels of government apart from local levels in how they draw on relational resources, is their position relative to authoritative, allocative and ideological structuring forces. Authority is held at the senior levels and delegated to local levels. The design of delegated authority structures is a first layer defining the power to act, and degree of integration across local and senior levels. Along with this is the systematic bias in taxation power between local and senior levels. Provincial and Federal governments can access a much greater range of potential tax revenue than local governments. This differentiates a basic ability to act by local and senior levels, particularly in areas like structural works where large amounts of funding are needed for a single project. Finally, senior levels are also largely responsible for setting policy and strategic direction. This gives them a more direct role in defining ideological structuring forces, including the ability to include or exclude other levels of government and stakeholders in developing that definition to begin with. For example, criteria for accessing the new fund for structural works are defined by the provincial and federal governments, with some input from the Union of BC Municipalities and others.

This plays out in various ways for the flood management system. For example, senior levels of government have more formal ways of accessing additional resources during emergency response than local governments. PEP can draw on the TEAMS program, while INAC and FNESS collapse into one organization. Local communities can coordinate and draw on local volunteers, but paid staff are not as readily accessible and coordination across communities is not formally organized. Within the FN system, there is a differential ability of INAC to act strategically at a provincial level on structural works due to its access to resources and ability to set policy, while local communities are mostly in a position of receiving project-based funding with little potential to act strategically.

These structuring forces can also be influenced more indirectly, for example through the ways that alternative capacities are developed at each level, and how local and senior levels are connected. EM networks at each of the local and senior levels have developed the capacity of

these levels to act independently as envisioned by the BCERMS/BC Flood Plan system. This is particularly consequential for local governments, given their limited ability to access and/or influence authority, resources, or agenda setting beyond what is given by senior levels. And networks linking senior and local levels for EM are also in place, developing further through experience and active maintenance. The formal basis for these networks provides structure and clarity, while the ongoing relationship-building improves the capacity to deal with unanticipated or complex situations and make joint decisions in areas of interdependence.

At the time of this study, integration was occurring at each of the local and senior levels for EM, but with different emphasis. The relationship between INAC and PEP has a formal, written basis that is developing further through shared experience and joint actions. At the local level, the relationship between CoC and some Stó:lō communities and representatives has aspects of formal connection (e.g. a Stó:lō representative on the CoC emergency planning committee), but is largely focused on relationship-building and joint actions.

The weak relationship between DFO and provincial/local levels is a recognized issue, due to its conflicting mandate with MOE as well as perceived and actual distance from other actors:

We have been trying to relocate the wing dike. That area all through there is considered floodplain, so there is potential for the water to get in there and flood. So it means that certain times of the year it might be fish habitat. Which means that DFO is saying that we can't build a dike on there...other levels of government are saying that the values of fish protection...are more important than the values of protecting First Nations or [Chilliwack]. (LG1)

### 5.2.6 First Nations Vs Non-First Nations Organizations (FNO)

The flood management regime demonstrates significant differences in the relationship between local and senior levels of government in the case of Stó:lō communities compared to CoC. In both cases, authorities are delegated to the local level in EM and SW contexts. But the type of relationship between INAC and Stó:lō communities, compared to MOE or PEP and CoC, influences the power to act that derives from those authorities. MOE and PEP have regulatory power to enforce various aspects of legislation that delegate authorities to local communities. But in practice, and especially in the case of PEP, they tend to enable and encourage local communities to act in accordance with legislation, rather than forcing them to. Two features of this relationship are a clear designation of roles and responsibilities in many areas, and an enabling or encouraging approach to enforcement.

In contrast, INAC and Stó:lō communities have a general agreement that communities are responsible for emergency planning, but this is less clear and defined than legislation guiding PEP and CoC. In addition, the historical relationship between INAC and First Nations communities has pushed assimilation and dependence, not the development of independence and capacity locally. The resulting relationship often operates more like a boss to manager relationship, than the enabling or cooperative relationship between PEP and CoC (and in some cases MOE and CoC). With respect to the process of dike construction, INAC provides funding and approvals at each stage of the project, while the Band itself manages the project:

And as each stage is approved, [INAC] would provide funding for the next stage and so on. So something like a Dike might take two years from design to construction. And [INAC provides] 100% of funding to make it happen, including the professional fees and so on. All that [INAC insists] on at the end of the day then, is that it's built to [INAC's] level of service standards, and of course [INAC's] engineers check that. (FNSG1)

In addition, the landowner/fiduciary duty aspect of INAC's role means that Stó:lō communities are at a relative disadvantage compared to CoC, in their ability to act when needed. Specifically, as the first line of defense, CoC will begin an emergency structural works project before funding is committed by the province or federal government, with the expectation of being reimbursed. Few Stó:lō communities would be able to do this; first, because they have less infrastructure to begin with; second, because they have less financial tools at their disposal; and third, because they receive funding from federal sources only. Also, while some authorities have been delegated, INAC does retain ultimate responsibility. In an ongoing context, the concentration of resources and decision-making power in INAC (and to the exclusion of the province) effectively diminish FN communities' abilities to act strategically (especially small communities) as long as funding remains project-based and driven by INAC.

The process of integration in EM is actually one of First Nations communities merging with the existing BCERMS-based system in place in B.C. This is not necessarily the equivalent of assimilation into the BCERMS system, particularly because the system itself stresses development of local independence and capacity to respond effectively, with senior levels supporting local actors where needed.

But the ability to integrate is mediated by certain factors such as capacity, commitment and connections. The capacity of INAC and Stó:lō communities to generate the momentum and investment needed to establish a formal EM system, and to maintain EM systems, is still developing. INAC sees EM as more of a priority due to promulgation of the *Emergency Management Act* federally, and was trying to establish a permanent EM position while continuing to cooperate with PEP and FNESS (FNSG1). Stó:lō communities are developing local systems, but are challenged by having almost no paid staff positions, less access to resources and lower commitment both internally and by supporting actors (FNLG1). This makes establishing a new system that much harder. They also face shifting connections post-freshet, as links to PEP loosened, and FNESS began to step in to fill some of the roles PEP plays for other communities.

Bonding values also play a key role in the ways and degrees to which integration may occur. For EM, BCERMS and the culture of EM are strong binding elements, along with the MOU between PEP-INAC-FNESS. But less codified values are significant for both EM and SW. The values and interests of Stó:lō communities and people are often not directly reconcilable with values or interests embodied in other government institutions and individual actors. This is a key driver for relationship-building and negotiation directly between Stó:lō communities and other actors, as a precursor to specific agreements around flood management. It's not just a matter of learning how to operate in a new system, it's about creating a system out of different perspectives, values, and interests. The local interdependence between CoC and some Stó:lō communities has driven these actors to engage in various ways in this process.

There are significant movements towards integration across First Nations and non-First Nations systems. In the case of EM, this is a systematic integration while for structural works it is happening in a case-by-case manner for certain communities in the case study area. In EM, strong collaborative relationships are occurring across local communities and across senior agencies (eg: INAC-PEP) in the case study area. There is an ongoing effort at both levels to develop and improve this system. As well, the pathways carved at each of the local and senior levels serve to pull the system as a whole towards greater integration. In SW, negotiation and relationship-building plays an important role locally in developing capacity to act over the longer term. CoC's agreement with Shxwa:y, ongoing negotiations with Skwah, and other joint projects and agreements are examples of how this is developing. Stó:lō communities exercising de facto

authority to deny trespass to CoC shifts power to act more towards those communities. However, integration is not occurring across the system, or particularly at the senior level for structural works, although the idea has been mentioned in forums such as the Fraser Basin Council.

#### 5.2.7 Emergency Management Vs Structural Works

The structure of relationships and associated distribution of powers and resources is markedly different between EM and SW. In terms of basic structure, EM appears as a multi-layered web, while SW is mainly oriented around discrete pockets of central actors. The primary actors in EM are local authorities, backed by a large supporting cast; in contrast, the primary actors in SW are local or senior levels (depending on the situation) without a supporting cast. This reflects the intentionally designed distribution of power across the web in EM, enabling actors (especially local actors) to do what is necessary when they need to. This distribution in SW varies by situation, and the power to act is commonly interrupted by the presence of gatekeepers at senior levels (DFO, MOE, EMBC, INAC).

There are differences in the types of power that are most important to EM and SW, and this is reflected in the structures of these systems. EM generally takes an open, inclusive and peopleoriented approach in the case study area. While roles and responsibilities are clearly defined, there is an emphasis on more informal, relational institutions as a necessary support. In EM, authority and resources are necessary but not sufficient factors for effective action. Relationshipbuilding and information sharing are key to effective functioning. In contrast, SW is more closed with narrow membership and a technical orientation. Relationships are structured along formal procedures predominantly (giving or receiving authority, funding, expertise, etc). While relationship-building is important in certain cases and can improve functioning where there are conflicts, it is not a systematic feature of the SW system in this case study.

Integration is a central organizing principle for EM, but not for SW. In the EM system there is a high degree of common membership in forums and ongoing interaction. Operational and decision-making levels are more integrated in EM than SW, and SW is not integrated horizontally other than in exceptional circumstances. For example, INAC is included closely in EM provincially, but not generally in SW. The systematic effort to improve integration in the EM system is not mirrored in SW where there is a lack of diagonal integration or regular forums

for building social capital. Especially on the short timescales of freshet, the absence of these elements makes it difficult to respond to local needs in terms of SW.

[During freshet] everybody had to get their work done in 30 days...It was all very collegial, and nobody was yelling at each other. But could there have been efficiencies? You bet there could have. ...if everybody would just relinquish a <u>little</u> bit of control for the greater good, and have an overall Lower Fraser Diking Authority, then we could all lever our little bundles of money into a larger pot and do more good. (FNSG1)

The contribution of the FBC and JPC to integration and social capital building for SW particularly, is unique and important in this respect but peripheral to SW processes and actor networks. And while the FPP may lead to a more integrated or collaborative structure across levels of government, it could also concentrate power at the provincial level (or somewhere in between). The one significant change in connectivity and function that is clear, is that flood management responsibilities have been scaled back in the MOE and enhanced in the EMBC.

Access to requisite resources and support is another distinction across EM and SW systems. For example, during freshet the Stó:lō communities have the same access to emergency preparation and response resources as other B.C. communities; however, the system for accessing SW funding is completely separate, administered by INAC. This makes for an interesting distinction, as INAC distributes funds according to evaluation of relative needs across the province while PEP/MOE distributes funds to communities that had ready-to-go plans to submit for application. This favours communities that have the capacity to develop plans already, over others that may not. In this sense, the INAC approach was more similar to the EM approach where the system orients to intentionally offer greater support where there is greater vulnerability.

Another distinction around access to resources, is the differential position of PEP and MOE in this respect. PEP is secure in knowing that their role will be adequately resourced as needed, while MOE has seen its budget, staff and responsibilities scaled back. It deals with this in part by working closely with the JPC on projects, directing leftover funding from their annual budget into projects that are important to support their ongoing role in flood management. While one-off projects cannot necessarily take the place of ongoing capacity and programs, the JPC work was filling important gaps.

## 5.2.8 Freshet Vs Ongoing

A key distinction between freshet and ongoing situations is the degree of urgency and focus directed at flood management in freshet situations, compared to ongoing situations. This has implications for the structure of networks and associated access to resources and authority. Particularly for the EM system for Stó:lō communities, reduced consistency and investment by their own organizations and supporting agencies means that their position went from being a focal point, to being another of many tasks to address in day-to-day operations. The shift from cooperating with PEP during freshet, to accessing support through FNESS (which was itself developing capacity), is an additional hurdle. In the SW system, multiple respondents noted that approvals from DFO are readily forthcoming during freshet, but often a point of delay in ongoing situations. Most obviously, funding was available during freshet (and continued after) that had not been available for some time.

There are different routes to power in ongoing contexts as compared to freshet situations. In ongoing contexts it is possible to sustain longer-term efforts needed to develop new ways of relating and working together, such as the relationship-building at local and senior levels of the EM system. This is a key difference for the SW system, where the network structure could be shifted to more of a web during ongoing situations through negotiations and the duty to consult with First Nations communities. While the overlaps in jurisdiction during freshet times were simply roadblocks, during ongoing times these overlaps create an opportunity to develop new relationships and ways of working together.

The Fraser Basin Council is another forum with importance in ongoing contexts. The FBC has no direct powers, and the longer-term capacity-building function of the FBC and JPC is not always directly attributable as a source of power to act. But the interaction of formal authorities, roles, responsibilities and resource allocation with informally-derived social capital and information sharing enabled in forums like the FBC are both critical pieces of institutional capacity, and especially the ability to develop this capacity over time. The potential development of the strategic Flood Protection Program could clarify the formal dimensions of governance, but was also drawing directly on the capacity of the FBC in its formulation in 2008.

# 5.3 Knowledge Resources

The network diagrams and associated discussion of Relational Resources begin to paint a picture of ways in which IC is structured, developed and made accessible in the flood management

system. Knowledge Resources (Table 5) builds on this to provide specific insight into ways that IC is available in terms of information, knowledge and learning. In addition to drawing attention to types of information and their accessibility across the system, this category especially draws out the importance of "frames" in affecting the ability of the system and actors within it, to perceive of and act on available information. It explores ways in which information and frames are integrated across the system, and to what extent new perspectives are incorporated into learning and development.

Table 5. Dimensions of Knowledge Resources	s (adapted from Healey et al., 20	03)
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Knowledge Resources	RANGE: The range of knowledge resources, explicit and tacit, systematized and experiential, to which participants have access
	FRAMES: The frames of reference which shape conceptions of issues, problems, opportunities and interventions, including conceptions of place
	INTEGRATING: The extent to which the range and frames are shared among stakeholders, integrating different spheres of policy development and action around place qualities
	OPENNESS and LEARNING: The capacity to absorb new ideas and learn from them

# 5.3.1 Range

There are three main knowledge areas commonly involved in flood management in the case study area. *System Knowledge* refers to information and understanding about how the institutional systems for flood management operate, including who actors are, what roles and responsibilities are, what procedures are in place and how to function effectively within these arrangements. *Flood Hazard Knowledge* is the range of information and understanding about the biophysical and climatic conditions that give rise to flooding, and how these translate into flooding in a location. Both scientific and experiential knowledge is part of this. *Place-Based Knowledge* refers to information and understanding of local or context-specific conditions and issues. While this overlaps at some points with *System* and *Flood Hazard Knowledge*, it also captures elements of the social, cultural, historical and community context in the case study area, which is relevant to the way that flood management operates in practice. All three of these knowledge areas are available to the various sub-groups of actors for flood management, but are used to varying degrees.

# 5.3.2 Frames

The frames employed by different actors or shared within certain networks (and not others) can serve to aid understanding or complicate misunderstanding of issues, problems, opportunities, and ways to manage them. As this is a crucial aspect of various dimensions of adaptability, detail is provided here to outline some of the types of frames existing in the case study, and how they interact and/or integrate across sub-groups.

# 5.3.2.1 First Nations Organization And Non-First Nation Organization Frames<sup>31</sup>

The historical relationship between the Canadian government(s) and First Nations people, with particular manifestation in the relationship between INAC and First Nation communities, has a deep influence on the way information and understanding across these groups is interpreted and made sense of. A number of frames derive from this relationship, some of which lend conflicting interpretations to the meaning of actions, and lead to different beliefs about appropriate conduct. For example:

- 1. INAC acts in the best interests of the government of Canada
- 2. INAC acts in the best interests of First Nations people and communities
- 3. INAC owes a duty to First Nations people and communities, on behalf of the government of Canada. This may extend to a duty to compensate for past wrongs
- 4. First Nations people and communities need to take responsibility for their own situations and earn their own way

INAC's approach has been changing over the years, towards greater reconciliation of these conflicting mandates. As described by one respondent:

The Indian Act says that we have all the authority to go in, do what we want when we want, under the Indian Act...the "wards of the crown", that's the language that's still prevalent in the Indian act. It's not practiced anymore, thank God. So as a federal employee what I did, my attitude, my philosophy, was that I am here to work towards the community goals...the old adage, "I am here from the government and I'm here to help you," was never uttered from our lips. First off, we need to build a relationship... We try to identify what it is that the community wants to attain, achieve. And then support the community to that end. (NGA1)

<sup>&</sup>lt;sup>31</sup> The current study does not provide the type of evidence necessary to delve into the deeper frames of distinct knowledge systems and worldviews, despite the importance of these elements. The discussion is limited to more explicit manifestations of distinct and shared frames.

The culture of governance in Stó:lō communities as compared to municipal, provincial or federal governments also gives rise to distinct frames across actors. Traditional governance of Stó:lō communities is based in the Siyam system, emphasizing lifelong development of wisdom which is recognized in attaining the respect of the community. As described by one respondent,

We don't have formal rules. Our work is guided by some simple teachings. The job of an elected leader, the job of a Siyam—in our language Siyam is wise, respected, wealthy leader...So if you were kind, generous, hard-working over a lifetime, if you kept doing that kind of work, helping others in need, sharing with others in need, doing all of those things over a lifetime, you earned that respect. Having earned that respect then, if you had expertise in a certain area, people would listen to you. And communities would come around to a decision, based on the respected person that was giving the advice and suggestions about how to resolve an issue or problem...When a problem comes up, we work out amongst ourselves who the best person is...to provide leadership on the problem. (FNLG2)

The presence or perception of racism by individuals and the system itself, also frames interactions. Speaking of an event during freshet 2007, a respondent remarked: "[An elected member of government] has done nothing for Stó:lō. And they are his constituents! It is institutional racism, and it is personal views that influence what these governments do...There are some reasonable folks, there are. For sure. We see that, when we see it. We see the other too" (FNLG2). This comes across in more tangible ways as well: "...it's interesting because if you look at the traditional sites of the communities, it's nowhere near where they are now. They have been purposely put in harm's way. And that is a very blanket statement, but the more that one does research on it, it's a very accurate statement too" (NGA1).

There are a number of new influences to the frames that link First Nations and non-First Nations actors in the case study area. For provincial agencies, the *New Relationship* means that "the tenor of our engagement is one of mutual respect and attempts to reach reconciliation...So we are much less concerned (but we are not completely unconcerned) about that jurisdictional boundary" (FNSG2). Frames such as those deriving from the historical relationship with the Canadian government, and perceived or actual racism, occur much more deeply than other frames around flood management—this means that there is a larger gap to bridge in order to create pathways for clear communication and information flow. That said, some of the most significant efforts to integrate are occurring across this gap. Formal representations include the MOU, the *New Relationship* policy, and Supreme Court decisions that collectively begin to define the basis for how new frames will develop. Partnerships and relationship-building are ongoing and serve to actively drive this redefinition. A local actor described this process as:

We needed a North-South road to go through their reserve land...But when we sat down over the years to talk to them about that, all they could see was a benefit to the city, and all we could see was a benefit to them, and wondering why we couldn't reach any kind of agreement. And it just took a couple of years of sitting down and talking and building some kind of a relationship. And eventually we got to the point where we could actually negotiate the right-of-way for the road...So it takes years—in my experience—it takes years of working at the relationship with individual Bands, to build up the level of trust. And then you can do anything you want, it's possible to work through any problem. But we make the assumption that the world works the way that we think it does—which is that we can put into a document, legally, what our relationship is going to be—and we don't need to worry about working with First Nations. We know that we have to develop relationships and trust, and then the document is secondary to the relationship. It's almost superfluous to what we need to do. (LG1)

Specific to the freshet preparations, Stó:lō communities hosted some of the emergency preparation meetings and an Honouring Ceremony to acknowledge all actors involved in preparations and response. These are important contributors to integrating frames across cultures.

Another example of this occurred during freshet preparations, when a Stó:lō community evacuated unnecessarily. Neither INAC nor PEP had word of this, and the Stó:lō EC, going on word of mouth passed through family networks, showed up on site where community members had gathered. Drawing on local memory of the last instance of severe flooding, they calibrated a makeshift gauge (a string attached to a stick), and agreed on the water level that would signal the time to evacuate, according to the Siyam system of decision-making. This was a great example of the possibility of integrating understanding of the BCERMS system with local knowledge and governance to find an effective solution. But there is also a lot of need for two-way learning to continue and improve across FN and non-FN systems: "I think that [Stó:lō communities] are still left out of the loop with different governments. It is better than it was before 1999... the relationship is much better, but it is still a work in progress. But we are still moving ahead, I don't think we are falling behind. I think there is slow progress" (FNLG1).

### 5.3.2.2 Local And Senior Government Frames

There are a number of ways that local and senior governments conceive of issues, opportunities and actions from different perspectives. For example, senior levels of government tend to have more generalized views of issues, which do not incorporate the complexity of details at a local level. At the same time, this allows senior governments to maintain a more broad perspective on issues, and to develop specialization in areas to support needs locally. For example, ...the regional perspective could be provided through provincial agencies. Whereas, one of the challenges is that each local government operates somewhat in isolation. They are only responsible for flood protection to protect their communities. So it's more difficult for them to take a regional perspective. And if you asked a municipal representative what are the regional priorities, each local government would say that it is their municipality. That is their priority! (NGA2).

Local governments face some common conditions that align their perspectives, for example, dealing with direct and specific concerns of community members on a day-to-day basis. CoC and Stó:lō communities have a shared landscape and some shared history and social structures in common, but they also have their own priorities and concerns.

Stó:lō communities, although they are divided politically on certain issues or at certain times, treated health and safety during freshet as a collective responsibility. In this case, the perception of connections ran deeper than divisions: "The issue for me is the safety of our people. So if I've got families in [another community] and they're not part of my tribal council, of course I'm going to make sure that they're aware of the issue, and that they have an opportunity to train and participate with others" (FNLG2).

An area where conflicting frames have an impact is where MOE and DFO mandates come into play for the same project. As described by a respondent, "...it's very difficult, because [DFO's] act says "thou shalt not destroy fish habitat." And [the MOE's] act says "thou shalt keep dikes safe." And we are getting close in a couple of places to a court case where it will be one value against the other, provincial legislation versus federal legislation... So there is a lot of work to be done there, and it is very difficult. Because both interests are important." (SG2)

Collaborative forums and networks introduce the possibility of collective frames that can cross these distinctions across communities and levels of government in some respects. The FBC and JPC in particular provide a model of collaboration and open multi-stakeholder dialogue from a watershed perspective. This explicitly aims to enable better joint decision-making, in part through development of mutual understanding and shared information.

### 5.3.2.3 Emergency Management And Structural Works Frames

EM and SW demonstrate significant differences in approach and culture, giving rise to distinct frames in many respects. The degree of knowledge integration within each of the EM and SW systems separately, relates to the frames around each. Most basically, SW is perceived of as a distinct, technical exercise and so the need for integrating knowledge is not a primary concern. In EM, integrating knowledge is seen as central to effective functioning; thus, it is an active area of concern.

Structural Works is understood as a technical field, valuing scientific and technical expertise to the exclusion of other perspectives. For CoC, determination of necessary structural works projects and upgrades is basically confined to the Engineering Department at the City: "the choices on what to do with the dikes come from Engineering...Of course we'll have consultants do a lot of the technical background work and provide recommendations. [Engineering] are the ones who feed that information up the line as to...here's our priorities, and get approval for what we're doing [from City Council]. But by and large that comes from Engineering" (LG2). This is not coordinated across diking authorities, either with neighbours (First Nation communities or other local governments) or at a more regional level. In general, CoC relies on "sound science" and adherence to scientifically-based standards as the justification for decision-making: "We will take the science and we will look at it and we will make our decisions that way. The risk assessment is something that we're working on right now. We do a lot of work in that area. As I said, we have spent millions on studies... and we will always continue to do that" (LG1). The approach for First Nation communities in B.C. incorporates some non-technical values into decisions around projects as well as technical values. As it is coordinated and funded by INAC-BC, the system prioritizes projects across communities based on a relative risk evaluation. Once a project is selected for funding, a variety of values are considered, from standard considerations of physical design, to fish habitat regulatory requirements and valued cultural sites.

On the EM side, the system has clearly defined roles and responsibilities, and takes a generally inclusive, supportive approach to functioning. It is well-understood that local actors are central, with other levels in place to back them up. CoC's perspective on EM shifted in 2007, from relying on written plans, to a relationship- and communication-based approach: "I've just found in this business that the relationship end of it is everything. And that if you don't understand all

the various players and what they bring to the table, that you are not going to be able to pull the rabbit out of the hat when things get rough" (LG3).

A key distinction across EM and SW frames is the presence of a clear system perspective for EM (BCERMS), and the lack of something equivalent for SW. Across levels of government, First Nations and extending to emergency SW operations "...this British Columbia Emergency Response Management System that we all fall under, that we all follow the guidelines of, that seems to be a driving force now in allowing us to work together, as opposed to beating each other up a little bit. Which is what has gone on, not just here, but all over" (LG3). BCERMS has also been helpful in First Nations communities, in providing a consistent language: "So I think that it is great that the province overall has one program so that if you were to walk into a community, the orange vest, the orange hat, or the orange badge means the same. In the municipalities all over B.C., well it's going to mean the same thing as in the First Nations community. And we haven't had that before" (FNLG1).

Definition of the SW mandate itself reflects a particular frame that has been chosen and drives what happens in practice. In the Fraser Valley, as in many areas of the world, structural measures predominate (Lapp 2005, Lyle 2005). Especially in response to the floods of 1948, the diking system became a main focus of flood management, which continues to this day. This is in spite of the fact that various individuals and organizations have attempted to instill a more holistic perspective of flood management over the years, with the Fraser Basin Council and its predecessor organizations being the most organized example of this. A resident of the Basin imparted this view:

So one of the things that I argue for is that we need to look at a model of management that takes into account the river. And not just in terms of levels—in other words, freshet and flood protection—but also the habitat and environment, fisheries, agricultural practices, management of effluent coming from industry and coming from communities. We need to start looking at, how do we manage the river? (FNLG2)

Collaborative forums, both within EM and across all of flood management, are a key mechanism serving to integrate knowledge across the system. In addition to integrating across groups, they are also key to bridging explicit and tacit forms of knowledge (for example, through tabletop evacuation exercises, engagement in exchanging field intelligence, and negotiations and joint projects). The Fraser Basin Council in particular, seems to have an important function in keeping

long-term, and Fraser Basin-wide issues on the agenda, and contribute to covering some information functions that are not covered by other agencies.

## 5.3.3 Openness And Learning

Overall, there is a high degree of openness and learning present in the system, and in each actor group. All interviewees agreed that learning had occurred as a result of freshet. This occurred in very direct and intentional ways, such as EM training, as well as through the experience of preparing for and dealing with the freshet event itself—for example, the process of developing plans, attending joint meetings, interacting with the public, evaluating preparedness and readiness, coordinating across agencies, etc. This was followed up by several official review sessions across various actor groups, and notably with the establishment of ongoing structural works funding and a provincial Flood Protection Program.

During freshet and in ongoing situations, there is significant investment by all actor groups in various forums and processes to maintain learning. Committees, meetings and collective training and tabletop evacuation exercises were attended by most actors at various points during freshet and at other times. Ongoing processes of negotiation and relationship-building are part of flood management and general interactions between various groups, especially across the First Nation/non-First Nation agencies or communities, and this enables learning on multiple levels. The Fraser Basin Council and JPC are a unique model of active learning in a system, creating contexts where the entire diversity of stakeholders on flood (and other river basin) issues can come together in discussion and collaboration.

One important difference is the types of learning that occur predominantly during freshet or ongoing times. Freshet is a unique opportunity where actors have some notice of an emergency or crisis event that may occur, and so there is a period of time where learning occurs through the experience of preparing and responding, the opportunity to test systems developed in advance, to become familiar with dealing with uncertainty and complexity, build relationships and understanding, and to enhance awareness of flood risk and how the system operates.

In ongoing situations, the types of learning described for freshet are one component of the picture, and dependent on availability of support, resources (often linked to political will) and interest. This is particularly acute for smaller communities such as some Stó:lō communities:

"Out of twenty-three, over half of the communities still have those community members that would know what to do [in an emergency]...But if we don't continue to support them, we may even lose them and go back to like in the beginning...But [the Bands] are still wanting to move forward" (FNLG1). But there are other types of learning that can only happen over a longer timeframe, or in less urgent circumstances. There is a chance to review systems and actions, something that PEP does and facilitates for others regularly. The ongoing situation also allows more space for reflection and changes in direction. Relationship-building in particular is an opportunity to get at learning at the deeper levels of frames held by diverse actors.

There was variation across Stó:lō communities during freshet, in their degree of engagement with the learning opportunities presented. There is also a range of approaches in ongoing times—while some communities will readily engage, others choose not to. The variation in engagement may be important in the sense of other levels of learning that may be needed in the system. Beyond the kind of direct learning that could benefit communities without emergency plans, for example, there is a great need for learning at deeper levels, across First Nations and non-First Nations actors. For instance, disagreements between CoC and neighbouring Stó:lō communities have become great opportunities for learning through relationship-building and long-term development of trust and mutual understanding:

When we sat down over the years to talks to [Sto:lo communities] about [the right of way for a road], all they could see was a benefit to the City, and all we could see was a benefit to them, and wondering why we couldn't reach any kind of agreement. And it just took a couple of years of sitting down and talking and building some kind of a relationship. (LG1)

Openness of these communities on one level might have prevented this more fundamental type of learning from occurring.

The SW system also exhibits some particular characteristics when it comes to openness to learning. There is evidence of a degree of openness to new ideas—for example, the CoC's exploration of a new risk-based approach. However, the prominence of structural approaches to flood management, and the lack of a comprehensive perspective on the impacts of this, are long-term features of flood management in BC.

# 5.4 Mobilization Capacity

Relational Resources and Knowledge Resources are two layers of IC that outline ways that network structure and information translate into capacity, power to act, and the ability to communicate and learn. The category of Mobilization Capacity adds to this by looking into features that enable the perception and mobilization of change by a collective. This includes perception of opportunities and constraints, and the degree to which these are shared; institutional spaces and types of techniques used to mobilize, and key individuals that aid in transitions during moments of opportunity (Table 6).

Mobilization Capacity	OPPORTUNITY STRUCTURE: Perceptions of opportunities and constraints
	ARENAS: The institutional arenas used and developed by stakeholders to take advantage of opportunities
	REPERTOIRE: The repertoire of mobilization techniques which are used to develop and sustain momentum
	CHANGE AGENTS: The presence or absence of critical change agents at different stages

# 5.4.1. Opportunity Structure

This section explores actor group perceptions of the desirability of, opportunity for and constraints on institutional change or development.

### **Opportunities**

Most actors perceived the freshet event itself as an opportunity, especially in a political sense and for generally raising awareness of flooding and its impacts. In this case, this combined with other events around the same time to give flood management a high profile in the public and therefore among decision-makers:

Last year several things came together. The flood profile got raised, all of a sudden everyone woke up to the fact that the dikes were too low. [Hurricane Katrina's impacts in] New Orleans really gave everybody an idea of how bad it can get. And then we had the high water warning. So it was one factor in a whole series of things. Everyone just sat up and went "oh, what was that"? (LG2)

Existing knowledge and experience are also seen as opportunities for driving or establishing institutional change and development. For example, existing relationships and agreements between Stó:lō communities and the CoC are seen as enabling factors for further development of flood management arrangements. Knowledge and experience embodied in the FBC is a key resource enabling the province's approach to the new FPP. And the Chehalis community emergency plan is being adopted as a template for First Nations communities across the province to build from.

The common frame of partnerships and relationship-building across actors is a major feature of institutional development and change in flood management. FBC's multistakeholder, collaborative, watershed-level approach to capacity-building is seen as an accessible platform for furthering institutional development, albeit with some limitations (see below). Systems for clarifying roles, responsibilities and common goals were also prominent examples of opportunities, cited in terms of BCERMS for the EM system, but also as a basis for a more effective SW system overall in B.C.

#### **Constraints**

One of the major perceived constraints to institutional change is political will, and the related issue of funding commitments. Especially for a jurisdictionally and substantively complex issue such as flood management, these constraints contribute to the sense that change is frustratingly slow: "The pace is what people find...it's glacial, right? It's just the pace that government moves. There's a lot of jurisdictions and parties to coordinate. So it's not through lack of effort, it's just that that's how long it takes" (FNSG1).

The tight link between short-term political interests and funding in the current system is a noted obstacle. With some exceptions, there is a tendency for issues like flooding to be addressed more as an issue of crisis management than through consistent or strategic planning: "And there should just simply be a plan, and it should be managed by, a River Association could manage that quite easily. But it's all far too political. And it's too ad hoc…it is being crisis managed instead of having a decent plan in place. That's what it feels like to me, after 10 years of banging my head into rocks" (LG1).

Some argue that decision-making power located in Victoria or Ottawa is a constraint on developing more appropriate and effective management of the Fraser River. "So that's why I'm saying there needs to be a way of dealing with the management of the River by the people that live with the results" (FNLG2). A direct example of this was the federal government's demand that (in return for their participation) the FPP operate through existing governance structures, although the original idea had been to develop a structure specific to realities of flood management in B.C.

The FBC is recognized as a place where alternative approaches and conceptions can be generated and communicated, but those actors who have authority or power to champion or implement such changes are not compelled to act on this, despite often participating in the discussion. There is ambivalence towards the FBC by some actors, as a result:

If [the FBC] have enough credibility to convince other levels of government that the risk is real, and that there needs to be more resources, then that's what they ought to be doing. But I don't think necessarily that they were created to be a lobby group. I don't know. I'm not sure what role they ought to be playing. As I say, I only go to the flood forums in the hopes of...using it as an opportunity to say that we have a serious problem. I was hoping that the Fraser Basin Council would be able to put forward the notion of some kind of proper river management scheme so that we wouldn't have to do this all in... it feels ad hoc. It feels like it's just banging your head against a wall and whoever screams the loudest gets some money. (LG1)

The ability of actors and actor groups to engage in collective action can be constrained by things like personality conflicts, differing values or interests, and deeper divides such as racism. The challenge of confronting institutional racism (in the sense of a systematic bias that is perpetuated in the design and practice of institutional structures) was echoed by a number of First Nations respondents (see Section 5.3.2, Frames).

#### Desirable Changes

Actors tend to agree that the EM system is effective, but can always be improved and renewed. There is a focus, therefore, on incremental changes through communication, education, feedback and review, and relationship-building. The system demonstrates an orientation towards active learning and relationship-building in its very functioning, and in general there is a "can-do" attitude among actors—they see opportunities for ongoing learning and improvement of EM and rarely mentioned constraints. One exception is that while Stó:lō communities and ECs are active and invested in development, they are constrained by the need for consistent access to information, funding and other supports, to maintain momentum until a system is wellestablished.

The desire to have a joint perspective on flood management, particularly with respect to structural works, is widespread. This ranges from better communication or clarity about roles and responsibilities, to establishing a new management body or a single diking authority for the entire lower Fraser River region. Development of the FPP in 2008 was proceeding by building on what already existed, rather than developing new knowledge or approaches. Although the province was considering an entirely new governance model for B.C., the federal government suggested its involvement was dependent on using existing governance structures (SG3). But many actors have expressed an interest in a comprehensive management body to oversee Fraser River flood management, and this has been a topic of discussion for decades (FNLG2; FNSG1; LG1; NGA2; Dorcey 1991).

There also seems to be a gap between what types of change are desired, and what is seen as feasible. A number of respondents discussed concerns with the basic approach to flood management through structural means, but most advocated for improvements and adjustments, not a significantly different approach. Above all, the availability of consistent funding and resources over the long-term is the issue of focus for structural works. This typically centres on the role of senior governments in providing more funding, and only one respondent mentioned the need to explore new sources of funding. This is despite the fact that there is not, and will not be, enough funding to cover municipal or reserve community needs.

Partnerships and relationships are a key type of institutional change seen as desirable by virtually all interviewees, and are of particular importance across First Nations and non-First Nations actor groups. These relationships can become the opportunity, as described by one interviewee: "It seems to me that with goodwill and communication, structure is less important...Because I think where local governments and First Nations can respect and engage at the local level, how provincial and national structures work can be mediated by that good relationship. So yes, I'm sure there are possibly a number of different ways to organize things. But in my mind what is always critical when you have really complex jurisdictional issues—and they will always remain—I think at this point in time, is just how are we working together" (FNSG2).

Addressing the structural works deficit in First Nations communities is an issue across actor groups. While most actors call for more funding, INAC-BC takes the position that they are adequately funding erosion and flood protection. Although the possible need for moving communities out of hazardous areas was mentioned by multiple interviewees, there does not appear to be any mobilization in this direction.

#### 5.4.2. Arenas

In EM, the main areas of institutional change and development are the ongoing review, and enhancement of the existing system in BC, alongside the establishment of more formalized EM systems in First Nations communities that connect to the BC EM infrastructure. In SW, the key directions are efforts to secure adequate, ongoing funding; resolution of cross-jurisdictional structural works projects; and ongoing development of relationships, partnerships and collaboration to sustain and improve the SW system. A combination of formally- and informallydefined arenas are utilized to pursue these types of changes in flood management.

Both local and senior agencies engage in defined forums and in looser networks to build and maintain engagement with EM systems. At a senior level, the Central Coordinating Group is a high-level arena that links the operational aspects of provincial EM, to decision-making channels in the provincial government. The inclusion of INAC in this group links that capacity to First Nation community involvement in EM. Other established emergency preparedness planning forums are a key arena for building and renewing institutional capacity across a diversity of EM actors. This extended to FNOs during and after freshet, and BCERMS is itself an institutional space providing clarity and access. At a local level, the CoC's EM planning group during freshet and their Emergency Planning Committee in ongoing times, are key arenas for cooperation and development across actors. The Stó:lõ EM network and family/community networks, are critical spaces during freshet and are also key to maintaining the development process post-freshet. Review sessions convened post-freshet provide an opportunity for exchange of experiences and lessons, and potential for joint action to build on the momentum of freshet.

Local governments attempt to influence funding decisions through direct and indirect routes to senior level decision-makers. CoC engaged through personal relationships and official meetings with provincial and federal elected officials. Local Stó:lō leaders lobbied senior levels of

government through the media. Various actors also participated in the Fraser River Flood Forum, so that their concerns (and desire for funding) would be heard by senior officials.

Various formally and informally structured relationships also provide arenas for pursuing institutional changes and development. Funding contracts and formal negotiations or agreements between INAC and communities serve as a space for influence. Likewise, the trajectory of flood management in the near-term will be directed in large part by the FPP and its funding mechanisms. The development of partnerships, agreements, joint projects and negotiations out of localized conflicts between CoC and neighbouring Stó:lō communities is an important arena for change. Both treaty negotiation tables and the FBC/JPC have a longer timescale of influence. Treaty negotiations are very specific between communities and other levels of government, while the FBC and JPC arenas serve particularly as spaces for convening around issues of concern to a diversity of members, and according to a certain vision that itself frames the potential for institutional change in the Fraser Basin.

## 5.4.3. Repertoires

#### 5.4.3.1. Emergency Management

The EM system is maintained and improved through a variety of means. Almost all actors develop and use formal plans and procedures that are in turn aligned with the BCERMS system. The function of monitoring and review of the system itself is built into these formal procedures, as is active coordination across actors and agencies. Coordination can be specific, in terms of defined roles and responsibilities, or more general, as established through understanding of the system and actor relationships that is built up through meetings and joint experience.

I think it's just because we've gone through a few campaigns together. The firestorms in 2003, the freshet last year, the forest fires that pop up everywhere during the summer. And then the annual floods. So there's this ongoing relationship and continual refinement of processes and so on. So I think that this helps form a relationship. And you feel part of the emergency management, it's a small, tight community. (FNSG1)

Likewise, relationship-building is a central tenet of the EM repertoire.

The process of establishing formal EM systems in Stó:lō communities that are connected to the BC EM system is proceeding dynamically through a diversity of techniques. The MOU and Standard Operating Guidelines between INAC, PEP and FNESS provide background to the ongoing process of integrating roles and responsibilities. Including INAC in the provincial CCG

was another step in this process. In local communities, the convention of requiring Band Council Resolutions in order for outside parties to enter reserve land asserts the de facto authority of local Councils with respect to the definition of roles and responsibilities. Also, local communities translate EM plans and procedures into the local context, bridging existing governance and EM capacity with the BC EM system.

INAC and local communities are developing the resource base to support this nascent system in various ways. INAC uses its formal financial power to require local communities to take on the responsibility of EM planning, but to limited effect. More recently, INAC and FNESS have turned to playing a supportive role towards communities, to make progress on their priority of developing emergency plans across the province. During the case study period, many communities turned to improvisation to begin building their EM capacity. Resources were temporarily diverted internally (e.g. by Stó:lō Nation Society, in allowing a staff member to serve as the regional EC), and networks were built across Stó:lō communication were maintained, but work was limited by the absence of ongoing programs or designated funding.

Relationship-building is a key part of the EM repertoire, both during freshet and in ongoing contexts. The INAC and PEP organizations continue to improve their working relationship through formal connections and ongoing coordination and communication. This relationship, in turn, opens pathways for First Nations communities. At a local level Stó:lō communities and the CoC coordinate their preparation and response activities (along with many other actors) to improve capacity for the entire area. The sense of a coordinated effort was reinforced through actions such as alternating the location of preparation meetings between CoC and Stó:lō venues, and participating jointly as speakers during well-attended public meetings:

So we had a panel of experts, [City staff], we had the RCMP there, the Mayor giving the political take on it, and then we had a representative from Stolo Nations in. So I think that we gave a fairly well balanced look to what everybody was facing. And there was an extensive question-and-answer at the end of it, and just from the types of questions that we got, I think that we got the message across and I don't remember there being anything negative. (LG3)

### 5.4.3.2. Structural Works

The primary issue of concern in SW referred to by actors is the need for adequate, ongoing funding. During freshet, direct and indirect forms of lobbying take place. CoC has plans

prepared in advance to take advantage of potential funding opportunities. Ongoing, the province decided to establish a new 10-year funding program, while INAC already has an established funding program for erosion and flood works. INAC approaches this through a risk-based prioritization of the entire BC region, while the province of BC evaluates proposals that are initiated by communities.

With the majority of financial and regulatory power concentrated in senior levels of government, other approaches are used at a local level to influence decision-making around structural works. The cross-jurisdictional dike scenarios illustrate some of these tactics. Withholding permission from the CoC to maintain, upgrade or rebuild dikes crossing reserve land has been useful in redrawing the institutional arrangements in the case study area. Out of local conflicts negotiations, joint projects and various modes of coordination and relationship-building have developed, shifting the routes to power. For example, the combination of the freshet threat and ongoing negotiations between the CoC and Skwah has brought INAC into the discussion about how to resolve this situation. From INAC's side, "particularly if there are partners involved and it's not just looking at INAC for money, if there's other folks that are bringing resources to the table, then we are more responsive to those leveraging opportunities. Because we can spread our money just that little bit further, right?" (FNSG1). And freshet also spurred negotiations:

We couldn't get anything out of INAC because they're not interested in talking about funding dikes, they've got other things to work on. So very few people were interested; whereas, [since the 2007 freshet] you've got raised awareness, so now there is provincial money, now there is the political will to make the gravel removal work. Now the INAC guys actually have a plan to raise the dikes, and are actually considering putting money at it. So it's considerably changed things. (LG2)

The province and the FBC play key roles in ongoing monitoring, review and information management in the SW system. One of the ways that the MOE has developed capacity in spite of internal cutbacks, is to commit funding to projects through the JPC, drawing on FBC's project management capacity. Other studies contribute to ongoing review and potential developments in the flood management system, such as the pilot study (with Chilliwack) on risk-based decision-making for structural works. The JPC also manages projects that other actors may not have the capacity or interest to take on alone but are important to the integrity of the flood management system, such as the review of land use planning in floodplain areas. The FBC, FPP, and CoC in particular, look to the creation and/or better communication of information as a strategy for influencing flood management.
### 5.4.3.3. Agenda Setting And Problem Definition

At a more general level, senior governments (through regulatory and financial powers) have the most control over agenda setting and problem definition that frame the possibilities for institutional development and change. The FPP is a case in point, as the provincial government was the one actor with necessary authorities, mandate and financial capacity to initiate such a project. As a result, it was also in the position to define the scope and governance of the program and control who would be involved in its development and implementation. The federal government was able to influence this at the beginning as a condition of providing funding, while local governments have little to no direct influence on this. At the outset, their voices were represented in consultations with INAC and UBCM and (along with all other stakeholders) the FBC (SG3).

The Fraser Basin Council serves as an important alternative to senior government agenda-setting and problem definition. The FBC is not only an arena, but also a repertoire for institutional development and change, in and of itself. The model of the FBC provides an opportunity to experience and understand a collaborative governance approach. Its articulated vision, developed and endorsed by the stakeholders it gathers together, provides a watershed-level, holistic perspective on issues in the Fraser Basin. It also provides a space for longer-term or contentious issues to stay on the agenda and move forward through discussion, study, and lobbying. In particular, it advocates for an integrated approach to flood management and watershed management in general.

The CoC works strategically in a number of ways to influence institutional development around flood management. Their engagement with the FBC creates opportunities to voice their needs and concerns to decision-makers directly or as part of the FBC collective. They also state that funding for SW is a provincial responsibility consistently (at the FBC and elsewhere), and include planned (but, as yet, unfunded) projects in their 10-year capital plan to emphasize the fact that these projects are on hold for want of provincial funding (LG1).

Stó:lō communities also work to influence the agenda for flood management. Court decisions establishing the duty to consult with First Nations means that they have a direct ability to influence projects, and are also (theoretically) more likely to have their interests considered by

proponents in initial stages. In addition to lobbying through the media, individual representatives participate in the FBC to communicate their perspective and interests to this broad group.

The *New Relationship* is an opportunity developed by the provincial government and First Nations representatives that shifts the "tenor of engagement" between these actors (FNSG2). With respect to flood management, MARR provides advice, education and information to PEP on how to engage with First Nations in a way that reflects the intent of the *New Relationship*. It also means that the province is looking for ways to partner with First Nations to further socioeconomic development and capacity building—for example, the province contributed money to support a gravel removal project where the proponent was the Stó:lō community of Seabird Island.

### 5.4.4. Change Agents

In the EM system for the case study area, there are a number of players that made key contributions to institutional change during freshet. The arrival of a new EC at the CoC was central to shifting their approach from "plans on paper" to a dynamic system based on relationships, information sharing and communication. The EC's inclusive approach opened the door for cooperation with Stó:lō communities that were interested in coordinating with neighbours.

If it wasn't for [the CoC EC] asking it might've been a lot later, and it would've provided a lot more...who knows who would have stepped up to the plate? But because of the thoughtfulness and the respect that the City of Chilliwack had, to involve the communities, is really why we had the success. Because of the importance they saw of the training and the plans and all of that. (FNLG1)

The initiative of the Stó:lō EC, seconded from the SNS to act on behalf of all Stó:lō communities, was also a key component of progress that was made. This individual served as a node connecting Stó:lō communities to one another, to resources and support from EM agencies, and in many cases to the CoC-led preparations. The Stó:lō EC also connected to key individuals, in particular a staff member at INAC and an ESS staff member from PEP, who were instrumental in enabling connections between the Stó:lō ECs or communities, and the PEP system. INAC itself played a key role in creating pathways and opportunities for involvement of First Nations communities in preparations and information sharing through PEP.

In the ongoing context, there were fewer change agents to sustain these efforts. The CoC EC continued to establish the new approach to EM. The Stó:lō EC continued to work "off the corner of a desk" to maintain momentum in order to institutionalize some of what had been built during freshet, but capacity was very limited. The community of Chehalis also played a central role in moving the learning process forward, by hosting meetings across agencies and opening its own training (e.g. tabletop evacuation exercises) to participation regionally. The ongoing context was lacking key individuals at other agencies, however, to maintain connections and information sharing.

Whereas the direction of change in the EM system was generally shared by all actors, there is still significant disagreement over SW, so that a variety of types of change agents are present. At the political level, a STC Councilor continues to confront senior governments and local decision-makers to convey his agenda and push for changes in funding and governance. The community of Skwah has shifted the form of engagement over the disputed dike, furthering the culture of relationship-building and negotiation to address jurisdictional disputes. A number of people connected to the case study area continue to articulate different visions for flood management in the area, but it is unclear to what effect. It is important to recognize, however, that slow-moving change (for example, shifting frames, visions, governance culture, intergroup relations) may be occurring in ways that are not yet recognizable.

The role of boundary organizations (organizations working across levels or policy networks) for fostering leadership has been posited (Olsson et al. 2006), and there are a number of such organizations in the case study area. Although they were still beginning to develop capacity to support communities with EM planning, FNESS has the potential to play a key role enabling communities to engage with formalized EM planning and preparation. In the case study area there were several individuals willing to take initiative on behalf of their Stó:lō communities, who are very limited by access to resources and support. FNESS could be pivotal to enabling that type of initiative.

Both MARR and the FBC also have the potential to encourage and enable potential change agents to take initiative in shifting the institutional arrangements around flood management (among other issues). MARR is the support for individuals or organizations that want to further the intent of the *New Relationship* agreement. Its presence is an indication that the BC

government supports action taken in this respect, providing space for individuals to take initiative. Likewise, the FBC has spent years operationalizing and demonstrating that a different type of governance is possible. Its existence and ongoing patronization by all levels of government and a diversity of stakeholders gives it a credibility and prominence that opens the door to individuals wishing to pursue collaborative, multi-stakeholder, integrative, watershedlevel change to the institutional system. Its role in maintaining and articulating a shared vision for the Fraser Basin is an open call for leadership to fulfill that vision.

### 5.5 Summary: Comparing Institutional Capacity Across Subsystems

This final section focuses in on the ways that IC compares across subgroups. It draws together the contributions to IC analysed above, and looks at how dynamics differ based on the differential institutional locations and engagements by the various subgroups. This comparison forms the basis of discussion in Chapter 6, which explores ways that IC impacts adaptability of the system.

#### 5.5.1 Emergency Management Vs Structural Works

The EM and SW systems are fundamentally different systems from an institutional capacity perspective. Structurally, as demonstrated in the network diagrams (see page 92/93), relationships across actors and networks show very different qualities. While EM networks are multi-layered with a supporting cast to enable necessary action by independent principal (local) actors, the SW system is organized into discrete pockets of main actors connected mainly by formal procedures and punctuated with gatekeeper roles. EM exhibits characteristics of openness, inclusivity, people-oriented, clearly defined roles and responsibilities and centrality of informal institutional arrangements such as relationship-building and information sharing. SW has a more narrow membership and scientific-technical orientation, and is tightly tied to authority and resource allocation. Overall, the design of the EM system provides clarity and flexibility and seeks to enable and encourage effective collective action for a common goal. The SW system is relatively more rigid and the design focuses action through individual projects that fulfill formal requirements and are driven by a mishmash of priorities. At a senior level, financial and political commitment to roles fulfilled by PEP (mainly EM) and MOE (mainly SW) differ significantly, as PEP is reasonably assured of necessary support, while MOE has seen its capacity and role scaled back in previous years. All in all, actors in the EM system are typically able to act as needed (with exceptions); the ability of SW actors to act as needed is conditional depending on the case (further detail provided in Sections 5.5.2 and 5.5.3).

The patterns of integration in each of these systems are also distinct. The EM system has integration as a central organizing principle. There is a systematic effort to integrate along various dimensions, evidenced by a high degree of common membership in forums and networks, and efforts at ongoing interaction at various scales. This system demonstrates significant horizontal, vertical and diagonal integration across actors, as well as some integration across operational and decision-making levels within agencies/organizations. The SW system displays some connection vertically, but little integration either horizontally or diagonally (the cross-jurisdictional dike project in the case study area is a notable exception). On the whole, integration in the SW system may occur case-by-case but is not a systematic feature. A basic contrast with the EM system is the lack of forums for joint planning, projects, and social capital building in SW. The presence of the FBC and its JPC are therefore significant for the SW system, although they exist in an institutionally peripheral space.

These types of differences in relationships across actors and networks extend similarly to knowledge resources drawn on and developed by the EM and SW systems. Accordingly, the EM knowledge system is actively developed and coordinated, placing the sharing and integration of a diverse array of types of knowledge (e.g. covering different scales, specific to comprehensive, explicit to tacit and from many sources) centrally within institutional functioning. The SW system, typically organized into discrete pockets of decision-making and action, correspondingly invests less in a shared and integrated knowledge system. Scientific and technical knowledge predominates in this system, and while some types of knowledge are shared and coordinated (River Forecast Centre; Dike guidelines, etc), for the most part knowledge is produced selectively at various scales as needed, with a project-by-project focus. The hydrological modeling completed in 2006 provided the first comprehensive evaluation of changes to river flows since 1969.

A notable distinction between these systems is the presence or absence of a shared system perspective, or frame. In EM, BCERMS and the culture of EM provide an overarching rationale and way of understanding one's place in the system. The long-term paradigm of a structural approach to flood management is a shared perspective in the SW system, but there are a divergence of perspectives on how this should be governed and how values should be represented in that process. Overall, the EM system demonstrates an active "learning system" orientation. While there were some new ideas that entered the SW discourse there was also resistance to change and learning outside of the accepted paradigm. Again, the FBC and JPC are a unique opportunity to keep long-term, basin-wide issues and alternatives in sight.

Both systems saw freshet as an opportunity for improvement and change. Where additional resources were needed in the system, they were accessed in the EM system mainly through networks and information sharing, and in the SW system through lobbying. The EM system's learning orientation contributes to an ongoing, incremental learning and improvement process, while the SW system has experienced punctuated shifts during openings created by crisis events.

### 5.5.2 Local Vs Senior Levels Of Government

The distinguishing feature across Local and Senior government's ability to act is their position relative to authoritative, allocative and ideological structuring forces. Each of these is defined principally at a senior level, while local levels find ways of influencing these structuring forces directly or indirectly (e.g. through the development of alternative capacities locally, and through connecting in effective ways to senior levels). Major differences are the greater taxation powers, formal access to resources during freshet, and ability to set agendas and membership at a senior level.

Integration across actors at senior and local levels occurs through different means. Locally, this is occurring principally through relationship-building, partnerships and joint actions, while the senior level tends to codify relationships in formal documents, which are built on through shared experiences and actions. Missing links across levels include the gap between DFO and local and provincial governments, and between MAL and the CoC. In ongoing times, the link between the Stó:lō EM actors and senior agencies is inconsistent.

Knowledge resources at a senior level tend to be oriented towards providing a broad overview and specialized expertise, with a focus on generalized or systematized information. Locally, details of the local context and application are central, with a focus on place-based knowledge that is integrated with generalized or systematized information. This is reflected in the types of flood hazard knowledge held at each level—the two complement one another and there is some sharing during freshet (e.g. RFC information reaching local communities, and local river gauge readings and experiential knowledge informing senior agencies). Senior levels have access to systematized knowledge at the time of freshet, while local levels have less of this information developed and access a variety of system, flood hazard and place-based knowledge through cooperation across communities. Individuals are key to this process locally.

The legacy of past knowledge development was a key feature at the time of freshet and following. Senior levels can draw on system-wide information, processes and procedures and joint experiences, while local levels have access to first-hand flood experience, local observations and records, studies and plans, and the tacit knowledge of individuals. As much scientific and specialized knowledge is beyond the capacity of many local governments to maintain, there is dependence in the system on investment at senior levels. This is especially pronounced in the case of SW for Stó:lō communities. On the one hand, knowledge is distributed but coordinated, across CoC and MOE. CoC bases its dike elevation levels on hydrological modeling by the province, and information and expertise relating to dike construction exists at both levels. For Stó:lō communities, however, information and technical expertise is generally housed at INAC, accessible only once a project is selected for funding.

And while some types of information are maintained, capacity in other areas has diminished in the past years. River gauges, river modeling, and floodplain mapping are types of information that were noted as requiring more consistent investment. The impact of the 2006 hydrological modeling study highlights the gap in ongoing knowledge development where the system is now relying on one-off projects like this for critical information.

Collaborative forums in EM and through the FBC/JPC are an important space for shared frames to develop across levels of government. The FBC keeps perspectives such as a watershed-level, longer timescales, collaboration, and multistakeholder process in the collective discussion.

At a senior level, regulatory, financial and agenda-setting powers are key repertoires for institutional development. At a local level, efforts to influence those forces as well as create new powers outside of that domain occur through techniques such as strategic positioning, lobbying, and relationship-building and partnerships. There were innovators, but no clear change agents, operating across local and senior levels for governance-level changes to flood management.

### 5.5.3 First Nation Vs Non-First Nation Organizations

A significant difference across First Nations and non-First Nations systems in the case study area is the type of relationship between senior and local governments in these contexts, which influences the power to act that derives from delegated authorities. In the BC government system, responsibilities of local governments/diking authorities are defined in legislation. PEP and MOE may enforce legislative requirements, but in practice they tend to enable and encourage action by local government. INAC-BC has contractual agreements outlining responsibilities of local communities, but other factors influence this expectation and the ability to act. The historical legacy has tended to have the influence of limiting development of institutional capacity and independent action of communities, and decisions made along the way have resulted in a dearth of SW construction in areas at risk. While the CoC can act to construct emergency SW with an expectation of being reimbursed, this is not the case for Stó:lō communities. In part due to the historical legacy, but also due to low financial capacity of local communities (especially smaller ones) since INAC is the landowner, First Nations communities can only receive federal funding (not provincial), and the tax base is very limited.

Interactions between the FN and non-FN systems form the principal site for integration across levels of government in the EM system, and in certain cases in the SW system. In the EM system horizontal, and diagonal integration are occurring across FN and non-FN systems. This is a systematic effort, but it was more vigorous and tangible during freshet than afterwards. The momentum and investment required to develop EM systems in and across FNOs was ongoing, but limited after freshet by connections, commitment and capacity. In the SW system there are significant instances of shifting power structures driven by FNOs. Court rulings, exercising de facto authority and withdrawal by communities have in some cases drawn power towards Stó:lō communities and shifted the structure of interactions with other agencies. This contributes to the process of relationship-building and negotiation, and appeared to be drawing INAC into local negotiations over the cross-jurisdictional dike. This is the only instance of possible diagonal integration for SW in the case study area. There is a lack of integration across the FN and non-FN systems for SW, made more apparent by the fact that INAC-BC was taking a strategic risk-based approach provincially, while the BC government did not.

Communication and information systems within and across Stó:lo communities and CoC are generally effective. Integration of FN and non-FN flood management knowledge systems could

be improved in terms of two-way communication and learning; and sharing knowledge between staff and political levels. During freshet, Stó:lō communities had a greater focus on developing system knowledge to enable integration with the BC EM system, as this was new to most. Senior agencies work to actively integrate the flow of information and building of knowledge across systems, and the designation of First Nations communities and other local governments as receiving equivalent treatment through the MOU, aids this. BCERMS and the EM culture facilitate better integration, and this was demonstrated in the Stó:lō EC's creative response to evacuation in a community where knowledge of BCERMS and the local context came together to manage an unexpected situation gracefully.

Conflicting frames (e.g. historical relationships, INAC-community interactions, governance cultures, racism) persist across FN and non-FN systems, both at the level of culture, tradition and belief and perpetuated in procedures and routines. There are also many examples of integrating frames that are developing at both of these levels (e.g. through court rulings, *New Relationship*, MOU, partnerships, relationship-building). An interesting process is occurring locally where the combination of interdependence and protracted disagreements create the opportunity for learning at deeper levels, across CoC and some Stó:lō communities.

Institutional arrangements across First Nations and non-First Nations organizations demonstrate the largest degree of separation, but also many of the more significant efforts towards institutional change. Historical relationships and the distinct separation of institutions across FN and non-FN communities point to a need for deeper institutional changes, which are being addressed through techniques such as relationship-building, partnerships, joint projects, negotiations, court cases, media involvement, intergovernmental and stakeholder forums, confrontation, withdrawal and articulating alternative visions. At a procedural and operational level changes are occurring as well. Formal examples include the MOU and standard operating guidelines, while more informally joint actions and experience, and relationship-building are enabling new ways of interacting to take hold. The institutional void at this level between the provincial government and First Nations communities (due to the constitutional division of powers), creates more of a blank slate on which to build procedural level institutions, which in turn may contribute to the ongoing process of learning and change at the level of culture and beliefs. FNESS and MARR could play an ongoing role in supporting emergence of change agents to further these transitions.

### 5.5.4 Freshet Vs Ongoing

There is a distinct transformation of networks, resource and authority flows to support principal actors to respond as needed during freshet, while the shape of these structures varied based on other priorities during ongoing times. Freshet is a focal point that saw an increase in active investment and support, and a tendency to perceive connections over divisions, even across networks. SW enjoyed an influx of funding and shift in political will during and shortly after freshet. The density of networks and willingness to participate and collaborate broadly, decreased after freshet.

During ongoing times, there is an ability to go beyond the short-term, immediate and intense focus of freshet to be able to look at longer time horizons and issues that cannot be addressed during freshet. An interesting dynamic that shows up in ongoing times and not freshet, was the more web-like structure that is beginning to take shape around the cross-jurisdictional dike negotiations (involving other actors and cross-government negotiations). Whereas areas of disagreement about this dike were a roadblock during freshet, they serve as a basis for relationship-building and learning in an ongoing context.

There is an investment across the system in openness and learning in freshet and ongoing times, but the prominent types of learning in each context differed. During freshet learning occurrs through experience, testing systems, building familiarity with complexity and uncertainty, relationship-building, increasing awareness of flood risk and system operation. In an ongoing context learning occurrs in terms of reviewing systems and actions, reflection, shifts of approach or paradigm, relationship-building and cultural understanding and maintaining base data and information on qualities and changes in a system.

Freshet was seen by all actors as an opportunity, and translated into punctuated change in the SW system for BC/CoC, and punctuated change in the EM system for INAC/Stó:lō communities. The SW system shows significant transitioning institutionally, from freshet to ongoing times (owing to the initiation of the FPP and long-term funding program). The Stó:lō EM capacity and momentum triggered during freshet does not have consistent support, information sharing or resources in the period immediately after freshet, in part because roles played by change agents in senior agencies during freshet did not transition into the ongoing context. As well, local governments were still awaiting updates from senior levels, on progress

made on lessons drawn from the experience. In ongoing times, the character of mobilization tends to be incremental, although in the EM system this was more consistent than in SW.

The importance of the FBC is emphasized in ongoing times. Although it has no direct powers, its capacity-building function is a resource that develops in ongoing times to be drawn on during crisis and especially in the longer-term. Social capital-building and information sharing functions filled by the FBC are unique in the case study area.

## 5.6 Conclusion

Comparisons across subsystems of the flood management regime reveal significant patterns and contrasts in the IC that is available to, and developing within, the flood management regime. The contrast in functionality across local and senior levels of government highlights the importance of control over structuring forces in determining both the location of the power to act, as well as influencing alternative techniques and strategies enabling alternative powers to act to be developed. This translates into dynamics around Knowledge Resources, and highlights the role of the FBC in bridging interests and capacities across levels. Across First Nations and non-First Nations systems, the case demonstrates some of the widest gaps and, correspondingly greatest potentials, for development of IC. This contrast draws attention to the deeper levels of IC and learning, and the combinations of formal and informal IC features that make collective action and IC development possible. Finally, comparing IC in freshet and ongoing situation emphasizes the way that different contexts can enable IC to be drawn on and developed in ways that address multiple needs and goals in the system. The following chapter explores ways in which these patterns and elements enhance or hinder adaptability in the system, according to eight adaptability features.

# Chapter 6: Implications Of Institutional Capacity For System Adaptability

## 6.1 Introduction

The previous discussion has identified some of the major IC factors that are contributing to responsiveness and development of the flood management regime. The following sections take this line of inquiry one step further, looking at how these issues play a role in enhancing and/or hindering adaptability of the flood management regime, in terms of eight adaptability features. As discussed in chapter 2, these eight features reflect institutional dimensions of adaptability as identified in the literature review. The chapter concludes with a summary of key findings.

## 6.2 Fit And Flexibility

The concept of fit refers to the degree to which institutional design matches the nature of the issue it is intended to manage, in this case flood risk. Flexibility refers to the ability of that design to respond to variation and change. Key characteristics of the flood risk for the Fraser River freshet are:

- 1. Flood risk is a multi-scale issue in terms of time and geography, and it changes over time
- 2. Flood risk is a complex issue involving intrinsic uncertainty. Sources of risk, areas of vulnerability and strategies to reduce risk are highly interdependent.

The two main timescales for the Fraser River freshet threat are short-term preparation and response in the case of a freshet threat, and longer (ongoing) timescales for mitigation and capacity-building. During freshet preparation and response, networks, resources and authority flows transform to support principal actors to respond as needed. Communication is intentionally enhanced in overlapping circles for effective dissemination across scales. In the case study area, existing relationships, capacity and knowledge are drawn together through forums that linked to necessary resources, information, skills and authority from senior levels of government. Priorities are clear, and all actors focus principally on protecting life and property through structural and non-structural means.

But the mismatch during ongoing times is an issue across the system. A major challenge to maintaining fit long-term, is the ability to sustain interest, relationships, knowledge, political will, and funding—this is reflected in the reduced density of networks and willingness to participate and collaborate broadly in the short time after freshet, along with some change agents

not transitioning their roles into an ongoing context. While priorities during freshet are clear to all actors (protection of life and property, along with other values outlined in BCERMS) and necessary support (including resources) is present, in ongoing times there is much more of a balancing act to be performed. Networks, resource and authority flows in the longer term are influenced by relative priorities of governments, and commonly shift based on political decisions. This is intentional, and provides a degree of flexibility that is useful. However, IC should also be developed in ways that direct this flexibility in ways that also strive to achieve fit with system characteristics.

The ability of the system to be able to supply resources to support a chosen strategy to address flood risk long-term, is a fundamental requirement for ensuring fit. Within the EM system this is generally satisfied and the MOU was an important step towards ensuring that this is so across B.C. FNOs are still developing their systems for being able to organize, access and/or mobilize resources, which will require attention in order to ensure that potential is turned into actual capacity to act. In the SW system, the chosen strategy (to keep flood waters out using structural measures) cannot be satisfied with available funding. The 10-year funding program that was established following the 2007 freshet threat is inadequate to address current projects, let alone adjustments or changes that may be required if climate change is taken into account:

"[The City of Chilliwack has] got a lot more work to do, probably \$25 million more worth of work to get the system up to speed. So the \$100 million program isn't going to solve all of the diking problems in B.C. if they stop it after 10 years. We'll chew up a quarter of it ourselves." (LG2)

"There is this whole issue of climate change and sea level rise, and [the MOE] is currently working on trying to update some standards for sea dikes...And both Delta and Richmond are applying to the funds for millions of dollars to raise the dikes for climate change...It's somewhere between \$100 million and \$150 million for [one municipality] alone." (SG2)

INAC-BC has dedicated \$2-3 million/year towards SW on reserve, which means that currently identified projects (totaling around \$280 million) would take around 110 years to complete. A spokesperson for INAC-BC has stated publicly that "We've fairly exceeded any other jurisdiction in investments in diking," investing \$36.6 million between 1999 and 2006 (around \$9 million of this in the Fraser Valley), and an additional \$3.3 million in the lead up to the 2007 freshet (Ken MacDonald, Emergency Management Advisor for INAC, quoted in Freeman, 2007). But outspending other jurisdictions does not mean that this action will actually address the existing flood risk, which is greater for communities that have been established in flood prone areas and have no structural mitigation yet in place. In other words, risk is not relative at

the local level—regardless of the degree of risk facing a neighbouring community, an unprotected community is still unprotected. Holding to this logic of relative levels of investment is useful as a justification for province-wide decision-making, but instates a frame that is in conflict with one based on recognizing and addressing actual system characteristics.

Ensuring that there is up-to-date information on system qualities and changes over time is central to matching decision-making with system properties, and this is a weaker point for the case study area. While some of the necessary information is being maintained and distributed through the River Forecast Centre, there are key gaps. The most glaring of these is the fact that the basis for evaluating flood risk in the province is a set frequency and magnitude of flooding (i.e. 1 in 100 year flood, based on the 1894 flood of record) that had not been updated since the 1960's. Without good information, planning is based on potentially faulty assumptions that hinder fit. Moreover, as the Knowledge Resources dimension of IC analysis recognizes, it is not only information but also the frames underlying chosen strategies, which affect potential for achieving fit. In B.C., frames that privilege a structural approach are entrenched and leave little room for alternatives to develop or be considered. While there are many ideas in circulation about how the FM system could be improved, the SW frame is still very dominant.

It is necessary that the system be attentive to, and have the power to act on, issues from a basinwide (and broader) perspective, and also that it be attentive to, and have the power to act on, issues from a local perspective. In addition, these factors need to be integrated across scales in order to address fit.

Access to the power to act plays out very differently in the EM and SW systems, due to the way that roles are defined and connections structured. In the EM system, resources are often accessed through a combination of networks, connections, formal arenas and information exchange, in the context of well-defined roles and responsibilities. Arenas are intentionally designed to provide overlap across segments of the FM community, facilitating exchange and access. Thus, capacity that is distributed among actors at various levels, is very intentionally linked institutionally. In the SW system the pattern is different, as capacity is focused at either the local or senior level and not typically coordinated either within or across levels. While responsibility for funding SW is understood to be with the senior governments, it is not always forthcoming, nor available to everyone at once. As funding is the main limiting factor determining the power to act on SW,

this is crucial. There are limited arenas by which to influence senior governments on distributing these funds, and lobbying is the common approach.

On the other hand, the system demonstrates the ability to shift the location of the power to act in certain circumstances. Building local IC, in particular, may help to "pull" the power to act into local arenas, reducing the relative influence of senior level procedures and decision-making. This appears to be occurring in the case of disputes over the cross-jurisdictional dike in the case study area, where the network structure is reconfiguring through added connections and shifting of access to locations of power to act (Figure 17). This places the Stó:lō community in a more central and active role than otherwise, relative to INAC-BC. The ability to shift capacity and take action at multiple levels creates better potential for fit in the system.

There is a distinction in the ability to act strategically on SW at local or basin-wide levels, between FNOs and non-FNOs in the case study area. Although the CoC was able to act strategically from the local perspective, there was low IC for coordinating across jurisdictions. This makes it nearly impossible for non-FNOs to act strategically on SW at a basin scale. In contrast, INAC-BC is able to act strategically at the provincial level in terms of distributing funding based on relative risk of communities, but project-based funding prevents strategic action at the local scale, because local priorities are constrained by access to resources, availability of which is set at another level. As well, the ability of the FNO system to organize strategically is severely limited due to the fact that it is not coordinated with provincial and municipal actor decisions.

Where uncertainty and complexity are an issue, integration and relationship-building are important aspects of IC that can enhance fit. The EM system embodies this knowledge, and so it is central to their way of operating. In contrast, the SW system relies principally on formal procedure and a scientific/technical orientation, and does not place processes of relationshipbuilding or multi-stakeholder process centrally. So while it can deal with the contained, projectbased scale of flood management as practiced, it does not lend itself to engaging with more complex elements of flood hazard management.

So, there is an argument to be made for the importance of designing collaborative, open networks into the system for the sake of dealing with uncertainty and complexity. But there may also be reasons to include more closed and exclusive networks—for example, the Central Coordinating Group is the high level decision-making body during freshet, allowing for quick decisions and actions to be taken. An associated IC concern is the degree to which fit is considered in the structure of network overlaps. For example, does the knowledge and flexibility held in more open networks connect effectively with centralized decision-making bodies so that this capacity for dealing with uncertainty and complexity is linked to decisions that are made? This combination of elements and the connections between them appears to be well designed in the EM system, but it does not cross over into the SW system.

Fit issues identified here include the strength of the system in responding to short-term threats, and challenges in dealing with the long-term needs, especially in terms of definition of funding requirements and maintenance of adequate information long-term and at a broad scale. There is a differentiated system in terms of access to power to act, which allows senior levels to pull certain levers while local levels have demonstrated the ability to shift the power to act to a local level in some ways. But there is a distinction still, in the ability of FNOs and non-FNOs to act strategically to address the multi-scale challenges of flooding. There is also a distinction in that the EM system is much better designed to deal with uncertainty and complexity, than the SW system.

### 6.3 Diversity

In a context of uncertainty, complexity and change, we cannot predict which resources will be needed in the future. The presence of diversity represents potential sources of memory, redundancy and innovation in the system. Therefore, diversity has value in its very existence and IC should support the preservation and creation of diversity to enhance the potential for adaptability. In this case, diversity was evident in terms of knowledge, tactics and values in the system. The ways that these components are represented or linked to decision-making and action also point to the importance of a diversity of actors being involved in flood management.

The exploration of Relational Resources in particular, highlighted the way that differences in roles, positions, capacities and perspectives across actors in the system give rise to a diversity of tactics (repertoires) to access or influence decision-making and action. Identifying the variety of repertoires present in the FM system allows for a new appreciation for ways that actors that have less direct access to formal powers find alternative ways to ensure that their interests are

represented and capacity utilized—in cross-scale contexts this is a rich source of potential fit, flexibility and adaptability. Disagreement over some tactics was expressed in the case study, which, one could argue, is a healthy state of affairs for system development. For example, an INAC official expressed frustration at the use of media by Stó:lō and other FN leaders during freshet:

People played politics with emergency management. Used it as an opportunity to lobby for resources and say that "we're not being protected" and so on. Even though the facts, in terms of, if you measure our investments on any sort of measure you choose, we outperform any other jurisdiction. So that's not a fair characterization. Yet people...when the National Chief of the Assembly of First Nations was out, some local Chiefs took the opportunity to use that for other purposes. Which is frustrating because it's a little demoralizing. When you have a building full of people here who are really dedicated to working with First Nations and really trying to make things better. And it's just discouraging sometimes (FNSG1)

There is a clear clash of ideas about which types of tactics are appropriate, but from a system perspective, each approach has validity for fulfilling certain ends—INAC staff were concentrating on established programs and the short term end of preparedness for communities in 2007, while this particular tactic by FN leaders also aimed at long-term and more systemic issues that communities are facing:

I said, "I need [the National Chief] to come and tour at least two Stó:lō communities." So that raised the profile of what was happening in Kwantlen and in Cheam. So it helped put some pressure on the government, but still not enough. We still don't have the investment in the infrastructure that's required to protect our communities. (FNLG2)

A similar argument can be made for the presence and integration of a diversity of values and interests in the FM system. Differences of opinion abound as to what the appropriate balance of values is for FM. In the EM system, this is formally laid out through BCERMS, which specifies a number of objectives for all actors:

So those eight response goals for response and planning, are what we use as a decisionmaking tool, and we use that for everything. Whether it's providing support to emergency social services, or amateur radio, search and rescue team, or a local authority, these are the response objectives that all the local authorities and governments adhere to, here in British Columbia.

This provides some coherence, so it is generally accepted that protection of life and safety are the priorities while other values can be sacrificed in the short term if necessary. When it comes to SW, the tradeoffs can be more complicated:

This is a perfect example: this one little area is a perfect example of how complex flood protection projects get. You've got your First Nations and your local government, environmental issues, ...really difficult technical problems, erosion, different flood

levels. And legal access and community development, because the First Nations land is on the outside [of the dike]. They want to develop their community, and that's the only land they've got. (SG2)

Some of these values are represented by different agencies and other actors. This is good for ensuring that the diversity of values is represented along the way, but can establish rigidity into the process as well. DFO, for example, was mentioned by a number of respondents at provincial and local levels as being an obstacle to getting things done. This is partly intentional, as DFO is a regulatory body in this respect. But DFO is also institutionally separated from other parts of the process, and respondents suggested that more investment in improving relationships and communication could help to bridge this gap (SG2). This is, in fact, one of the major contributions of the Fraser Basin Council to adaptability in the case study area. They provide one of the few opportunities, for multiple values and interests to meet and interact, enhancing the capacity for decision-making that takes many perspectives into account.

However, the paucity of alternative flood management and funding mechanisms in the case study area underlines a base level of resistance in the system to a diversity of influences and strategies. Instead, factors such as the concentration of agenda-setting power and traditional funding sources at senior levels of government reinforce the accepted approach to FM as dominated by SW. As well, governance of the FM system is tightly linked to political decision-making, making certain options very difficult to implement, even if they are the most rational choice: "Of these three things [Dike safety/Land use/EM], given our development growth, [flood hazard land use management] is by far the most cost-effective way to deal with the whole problem. It is also the hardest politically. You have to educate people, educate politicians, and it is a very long-term thing. And people just don't want to think about it." (SG2) So, while the presence of diversity in the system has its own value, the degree to which it is actually integrated into decision-making and action is an important consideration for adaptability.

Similarly, a diversity of types of knowledge is available within the system and, in this case, it is more the ways that different types of information are integrated into decision-making and action processes, that has implications for system adaptability. At a local level there are numerous examples of effectively drawing on "social memory" in preparation and response to the freshet threat. In CoC's approach, a recognized lack of systematized knowledge (place-specific planning

116

and tacit knowledge of flood preparation and response) was addressed in the hiring of an experienced Emergency Program Coordinator, who in turn proved effective at integrating "social memory" and local knowledge held by neighbouring First Nations individuals and communities. As well, the Stó:lō Emergency Coordinator demonstrated exceptional capacity to integrate newly developing system knowledge (of BCERMS and the provincial emergency system) with social memory of previous flood events and local (Siyam) system knowledge to effectively manage a community evacuation<sup>32</sup>. These individuals enabled existing knowledge to be identified and mobilized in new ways that did not translate into assimilation of that diversity in the process.

These examples shed light on the value of having a diversity of actors (including individuals) included in various ways in the FM system. Notably, the inclusion of Stó:lō actors in the process in new ways allows the system to draw on and further develop the capacity of the whole case study area to manage the flood threat. PEP recognized the importance of having Stó:lō actors trained and included in the BC emergency system, and prioritized this.

What it means is now, for [PEP], it is a cohesive response. Meaning that we know that Chilliwack and the First Nations communities are linked at the hip...and we don't have to go in and sort of put in a backdoor plan in place with INAC on how are we going to deal with the Stó:lō communities. (SG1)

As well as enhancing those communities' preparedness and ability to respond, it creates benefits for the whole system:

[PEP] like to know where all of us are at, they like to know what our capacities are. Because then they can make advanced planning moves. So if they thought that we were doing pretty well in Chilliwack, then they don't spend as much effort planning. Because they think that we have a handle on it. They'll help someplace that is perhaps not as organized. (LG3)

Integration of typically marginalized groups into FM creates an opportunity for incorporating new sources of ideas, strategies, expertise, values and frames that would not typically be available to the system. Stó:lō communities are in a unique position where they are now able to converse with the BC emergency management system, while still possessing a wealth of explicit and tacit knowledge of the river system and local emergency management that could also be of benefit to the system. Given the history of assimilation and extinguishing of local IC in the relationship between the state and First Nations communities (RCAP 1996), it is worth making a

<sup>&</sup>lt;sup>32</sup> See Section 5.3.2.1 for description of the event

clear commitment to integration without assimilation in the evolving BC emergency management system.

### 6.4 Information Management

In addition to having a diversity of types of knowledge present, adaptability depends on information connecting and interacting at a system level to inform decision-making and action at all levels and in response to unforeseen circumstances. IC impacts information management in the case study particularly through the availability and design of arenas and networks for information exchange, availability of resources and technology to different actors.

The different patterns of information flow in EM and SW are reflected in the structure of relationships and forums in place in each situation, whether or not they are designed intentionally for information management. The presence of open networks in the EM system enables information sharing, which contributes to making the distributed power to act feasible— whomever is responsible for taking action needs to have good information to make an informed decision, or to support the actor who is taking action. In contrast, the SW network structure shows frequent one- or two-way information flows between select actors, and much less use of open networks. While this is efficient for managing flood risk on a project-by-project basis, it misses the big picture of what is happening more broadly in the river basin. This is a red flag in terms of adaptability, because if actors are not aware of system conditions and the interdependence of their actions across space and time, there is little ability to adjust or change course until one is forced into recognition by a catastrophic event (or close call). And if information on system conditions has not been maintained, then the ability to adapt following a flood threat will be constrained or delayed, and may be carried out in a way that does not provide a better fit to system conditions.

The types of information that are developed and incorporated into the system depend significantly on the financial and technological resources available to different actors. Control over the frequency and quality of types of information used collectively is determined by senior governments whose priorities do not necessarily align with needs of local governments. The most recent example is that the FPP sets conditions on the types of studies that may be conducted with the new source of funds now being distributed. These funds will not address gaps in information on more comprehensive system conditions, and they are not available to non-FNO

118

communities. This case study also provided examples of alternative ways of drawing on or developing IC in ways that respond to the concerns of local levels or other interests. During freshet, for example, collaboration across local actors and bridging to senior agencies, mobilizes knowledge in ways that enhance system preparedness and capacity. In ongoing times the FBC/JPC is able to reconfigure capacity and resources to address joint needs:

It might be that some projects just wouldn't get done. Or they wouldn't be done, I would say, at the same scale. One example, we are working now to develop a consortium or a partnership group to develop better topographic mapping for the whole lower Fraser that can then be used to develop more floodplain maps and address that information gap. Three organizations contributed funding towards that and since that foundation was put in place, we were able to secure additional funding from three local governments to extend the project area. We are also looking at developing some sort of terms of reference or a memorandum of understanding to provide some institutional structure for that kind of partnership. I don't know if any one of the partners would be in a position to take that on. So they all have their own interests and needs, but I don't know if they would be in a position to extend beyond their own primary interests. Whereas we can help enable this type of collaboration and coordination to happen. (NGA2)

Similarly, in the context of reduced capacity at the MOE, the FBC/JPC finds ways of updating the information on river hydrology that is an important resource to many actors. There are two perspectives on the significance of this. On the one hand, ambiguity around the commitment of the provincial government to maintain the model annually is a concern from a longer-term adaptability perspective:

Right now I'm still wondering what the fate of the whole model is because we don't have a modeler. [MOE] operated the model in real time this past spring, [we paid] for a consultant to run it for a month...I am worried about what we will do next year. So we are not in a sustainable mode where we have a program where we can maintain some of these activities. And we sort of use the Fraser Basin Council to get out of jams, to fill in gaps where we can't do something. (SG2)

On the other hand, the presence of the FBC provided capacity that allowed for critical information to be generated as an input into management, which would not have happened otherwise.

We are in a good position to be able to pool resources together from provincial, federal, local governments to develop better information about the flood hazards. Like the flood model. And with that information, the Ministry of Environment adopted the results of that flood model as the official flood design profile. So that is one where it is clear, that wouldn't have happened if the project hadn't happened. (NGA2)

The lack of senior government initiative to update the flood model ultimately led to the development of alternatives. In the long run, this distributes capacity and enhances options for flexibility and adaptive responses.

## 6.5 Sensemaking

Sensemaking is the connection between the social-ecological system and social learning. This occurs through the processing of knowledge of flood risk as it interacts with the social and institutional system. The concept of sensemaking is comprised of seven properties, as discussed in Section 2.2.4 ("Sensemaking"). Weick (2001) has translated these properties into questions that inquire as to how organizational (or institutional) form contributes to sensemaking in the context of global social change. This is also a good starting place for considering the way that IC contributes to sensemaking in ways that enhance or hinder adaptability:

- 1. Social context: does the form encourage conversation?
- 2. Identity: does the form give people a distinct, stable sense of who they are and what they represent?
- 3. Retrospect: does the form preserve elapsed data and legitimate the use of those data?
- 4. Salient cues: does the form enhance the visibility of cues?
- 5. Ongoing projects: does the form enable people to be resilient in the face of interruptions?
- 6. Plausibility: does the form encourage people to accumulate and exchange plausible accounts?
- 7. Enactment: does the form encourage action or hesitation?"

The following discussion explores elements of IC for sensemaking in the case study area, with reference to these seven properties.

Frames and other institutional elements are interdependent, impacting what (and who) is perceived, valued, understood and included in decision-making and action. The scientific, technical focus within the SW system, for example, largely restricts the definition of SW to a technical exercise. And the dominance of the SW paradigm limits the capacity to perceive alternative approaches as viable. The presence of the FBC may have a moderating influence in this respect, as its vision presents a model that includes long-term and basin-wide perspectives, a focus on sustainability—broadly defined—and the value of multi-stakeholder, collaborative process to improve decision-making. This allows for new ideas and processes to be introduced, and experimented with, in the system.

Frames are also central to potential "interoperability" of knowledge systems, or the ability to communicate and understand across groups. BCERMS, for example, provides a clear explanation of priorities, roles and responsibilities that allows for actors with very different perspectives and interests to communicate and act collectively, even in stressful situations. During and after freshet, this proved helpful in mediating across non-FN and FN actors:

...Say an emergency coordinator is up visiting family in Kelowna and there's another fire. Well, that person is going to know how that emergency program works up in Kelowna as it does down here. So I think that it is great that the province overall has one program so that if you were to walk into a community, the orange vest, the orange hat, or the orange badge means this. In the municipalities all over B.C., well it's going to mean the same thing as in the First Nations community. And we haven't had that before. (FNLG1)

In contrast, conflicting frames that derive from historical relationships between FN and non-FN actors can negatively affect the "interoperability" of communication across these groups.

The frames that guide different functions in the system are in turn embodied in the institutional capacity available to actors, and can significantly impact the ability to engage with change. In the first place, an actor's place in the system is one factor influencing perception of risk, change, and potential adaptability of the system itself. Respondents were asked to rate how likely it was that climate change, population and economic development, and First Nations rights and title would drive changes in the flood management system. Climate change was seen as the most likely driver of change of the three options, particularly by EM and FNO respondents. In addition, the potential for all three of these three drivers to influence the flood management system was rated more highly by FNOs and Local levels of government, than by non-FNOs and senior levels of government. Overall, the system was perceived to be generally adaptable, but moreso by EM than Others. Whether an actor is able to perceive risk, change, or potential for adaptability will influence the willingness and ability to act.

The EM system is intentionally designed to deal with uncertainty and complexity, so information that has significant uncertainty associated with it is generally not a hindrance. In contrast, the SW system does not have the same flexibility:

That's part of the problem with predictive modeling. How do you take into account climate change when you don't know what it's going to do?...The disastrous flood conditions occur if you have a heavy snowfall, a cold spring and then it gets hot really quickly, accompanied by rainfall. So is that more or less likely to happen with climate

change?...We only have 100 years of data. The Dutch have 500 years of data and they're finding their irregularities. (LG2)

In the current situation it is apparent that climate change will shift the flood risk in different directions, but it is not possible to provide the type of data that the SW system relies on and is used to dealing with. From a sensemaking perspective, the challenge for the FM system, and SW in particular, is to come to terms with that and find new ways of dealing with the information that can be made available. It is when "people lose their ability to bound ongoing events, to keep pace with them by means of continuous updating of actions and interpretations, or to focus on interrupting conditions, [that] they begin to lose their grasp" (Weick 2001).

The knowledge held in First Nations communities and individuals about the river system, and the strength of alternative frames in those communities is an important sensemaking asset in the case study area. The presence of local knowledge was recognized during freshet, and incorporated into decision-making processes:

And the more information that I've got, the easier it is to make a plan. And our First Nations in the area, again there was enough knowledge, they had been through the last one in '48, and '72, and a little bit of a threat that we had in '99. So again, they kept seeing the waters go up and down, and they would walk me over to right by the water, and say that step there, that was underwater. Or, that mailbox there was under water. They're all very in tune about what the Fraser has to throw at them. (LG3)

As well, alternative understandings of the river that reflect system dynamics are present in the case study area, for example: "Stó:lō are people of the river. That's what Stó:lō means: "people of the river." And it refers to the Fraser. But it's not just the Fraser River it's also the watershed. So all those rivers and streams that flow into the Fraser include our people" (FNLG2). Taking this as a starting place, different management approaches can be seen as natural and desirable:

The cost associated with infrastructure, to protect our communities, is prohibitive. So we need to make some very astute decisions about investment. So one of the things that I argue for is that we need to look at a model of management that takes into account the river. And not just in terms of levels, in other words freshet and flood protection, but also the habitat and environment, fisheries, agricultural practices, management of effluent coming from industry and coming from communities. We need to start looking at how do we manage the river...The problem was when they started building those dikes in the way that they built them, they made the decision that they know more than Mother Earth. They still don't understand that they were wrong then, and they're wrong today. So that's why I'm saying there needs to be a way of dealing with the management of the river by the people that live with the results. (FNLG2)

The incorporation of First Nations experience or knowledge is not legitimated in all contexts in the system, so this is still an ongoing challenge and can't be taken for granted. To this end, processes such as ongoing negotiations, partnerships, MOUs and so on, create important opportunities for the sensemaking assets held by First Nations to be incorporated into the broader system.

There is substantial experience with institutional sensemaking in the case study area, and its presence could itself be highlighted in order to serve as a cue to empower actors in knowing that there are precedents to draw on. While the specifics of ongoing change (such as the impacts of climate change on flood risk and management) may seem overwhelming and unresolvable at first glance, knowing that there are well-developed and reliable mechanisms available for making sense of seemingly impossible dilemmas provides a place for actors to focus their energies. This can enable step-wise action to be taken so as to move the system forward towards a more adaptive state. Three examples of institutional sensemaking processes in the case study area are presented here to serve as guidance in this respect. These are: the City of Chillwack's "strategic positioning" repertoire; the presence of interactive forums; and the Siyam system of governance in the Stó:lō Nations.

The City of Chilliwack enhances its capacity for sensemaking through the variety of connections and processes it is engaged in that enable exchange of information and ongoing translation of their place in the system and ability to work with other actors. Their engagement with the FBC is used to stay abreast of discussions, ideas and new opportunities, while also capitalizing on chances to voice their needs and concerns to decision-makers directly or as part of the FBC collective. They also act strategically to convey their perspective that funding for SW is a provincial responsibility. They repeat this message consistently (at the FBC and elsewhere), and include planned (but, as yet, unfunded) projects in their 10-year capital plan to emphasize the fact that these projects are on hold for want of provincial funding. They base their flood management decisions in large part on underlying scientific studies on topics such as flood hazard mapping, gravel removal and a current study on risk-based analysis of flood hazards with a Dutch consultant. They make significant investments in these scientific studies to support decision-making, and also invest in ongoing dialogue and partnerships with other actors—notably the EM community, and neighbouring First Nations communities—that enable difficult issues to be gradually worked through. The CoC's active and intentional engagement in such a

variety of forums enables them to act nimbly as required, while also ensuring that longer term issues such as the cross-jurisdictional dike are being worked through.

One of the institutional elements that influences the ability to perceive of plausible alternatives is the presence of arenas and forums that encourage dialogue and conversation and enable access to salient information and perspectives. All in all, the EM system makes more deliberate efforts to ensure that this was occurring in ongoing times as well as during freshet. Forums allow for this concern to be raised and heard by the various parties. In the SW system, arenas tend to be a way to exert influence directly between actors. Forums for exchange are not commonplace in the course of regular operations the way that they are for EM, but the FBC is an important exception. For those actors who choose to participate, this is a unique forum for continued dialogue and collaboration on issues relating to FM in general, and particularly for SW concerns. This is where longer-term issues are often explored, relationships develop and studies are initiated. Importantly, the FBC's position allows them, uniquely, to span boundaries where otherwise there could be interruptions in understanding and interpretation across those subsystems. This type of discussion is a critical contributor to sensemaking, as it is one of the only ways that knowledge on long-term issues can be exchanged, deeper frames can be considered and alternatives developed. The dialogue that occurs can help to develop a sense of plausibility of new directions, and the capacity of the FBC as funding and project managers allows action to be taken in support of this. The FBC and JPC initiate studies, develop new forms of partnerships and pilot new approaches to managing flood risk, as well as providing much of the capacity from which the FPP was built.

Another example of institutional sensemaking capacity in the case study area is the Siyam system of governance, described by a Stó:lō representative:

We don't have formal rules. Our work is guided by some simple teachings. The job of an elected leader, the job of a Siyam—in our language Siyam is wise, respected, wealthy leader. So you earned that title in the past by what you did, by how hard you worked, by how generous you were with your prosperity. You earned that respect. So if you were kind, generous, hard-working over a lifetime, if you kept doing that kind of work, helping others in need, sharing with others in need, doing all of those things over a lifetime, you earned that respect. Having earned that respect then, if you had expertise in a certain area, people would listen to you. And communities would come around to a decision, based on the respected person that was giving the advice and suggestions about how to resolve an issue or problem. And that's why I said that we rely on people for their gifts. When a problem comes up, we work out amongst ourselves who the best person is...to provide leadership on the problem. (FNLG2)

The system of providing community recognition to individuals' developed wisdom is a mechanism by which decision-making in a context of uncertainty can move forward. This embodies all seven properties of sensemaking described above.

These examples illustrate how including a diversity of perspectives in forums for dialogue presents the opportunity to debate, discuss, collaborate and compromise in ways that draw on a broader set of experience, understanding and "social memory." Especially when dealing with novel situations and challenges, this kind of "triangulation" of perspectives can contribute to the perceived credibility and legitimacy of knowledge in the absence of certainty. This is critical to producing knowledge that can actually be used in decision-making processes. Sensemaking is a critical but little recognized part of the institutional infrastructure required for system adaptability. Sources of sensemaking capacity already exist, but making this a more conscious activity in the system would help to ensure that assets contributing to it, are valued.

## 6.6 Social Capital

Social capital refers to the density of connections between actors, and associated relationships based on trust, mutual understanding and reciprocity. To appreciate the ways that Social Capital influences collective action, it is important to distinguish between at least two types: bonding (social capital across like actors) and bridging (social capital across unlike actors). While this study narrows in on bridging social capital for the most part, bonding social capital comes into play in interesting ways as well, with implications for adaptability of the system. This section explores ways in which social capital (which overlaps to a great extent with "relational resources") is seen to enhance or hinder adaptability of FM in the case study.

Development of social capital is critical to effective, and adaptable, action across groups, especially where there are significant differences that make it more difficult to know what to expect from one another (Rydin 2006). As mentioned previously, formal elements like the MOU and BCERMS are useful for enabling communication and coordination across FN and non-FN actors. But social capital, and particularly the way that individuals helped to develop this across actors, also plays a role in how effectively communities actually worked together when it came down to it:

If it wasn't for [the CoC Emergency Coordinator] asking, it might have been a lot later, and it would have provided a lot more—well, who knows who would have stepped up

to the plate? But because of the thoughtfulness and the respect that the City of Chilliwack had, to involve the communities, that's really why we had the success (FNLG1)

From the point of view of the CoC Emergency Coordinator, the core of EM is really in relationshipbuilding:

I'm more on the end of trying to develop relationships and learn how we can all work together rather than setting down something in black and white and saying this is what we're going to do. I need to find out what we're able to do. What we're capable of and then make the plans fit...I've just found in this business that the relationship end of it is everything. And that if you don't understand all the various players and what they bring to the table, that you are not going to be able to pull the rabbit out of the hat when things get rough. So you've got to get all this stuff developed in advance. The First Nations were not involved in the original planning in Chilliwack. the school district was not involved, the health authority or the hospital were not involved. And without all of these players involved you just can't go anywhere. (LG3)

And when it comes to coordinating EM between the CoC and Stó:lo communities, there are

other factors that were made easier due to the approach of the CoC Emergency Coordinator:

So I really believe that, the City of Chilliwack, their [Emergency] Coordinator, he has one of the best ideas going, in all of the municipalities that we try to work with. Which is: get the First Nations communities, or a spokesperson...or somebody, on board, and getting their communities up and going with our Emergency Management. (FNLG1)

On the other hand, there is also strong bonding social capital within Stó:lō communities, together with a political division across them. This added complexity was possible to navigate due to the specific individual who came forward from the Stó:lō Nation Society:

And because of her other work [as a Social Worker] she is able to travel to all of the Stó:lō communities... even though there's kind of two factions... she is one of the few that can go to any one of them and is accepted...I invited someone from Stó:lō to come and she ended up being the one coming in. Since she started the involvement with our emergency program she has taken a lot of courses, she has brought Emergency Social Services into the Stó:lō Nations. (LG3)

Individual actors do make a difference to the development of social capital, and therefore the ability to coordinate action for greater adaptability.

This example also highlights the importance of recognizing the ways in which formal and

informal elements need to be in place for the two systems to work in synchrony:

So there are two different laws of the land. And it's not up to me to tell the Stolo people it's time to go. But I can certainly advise their administration and their

leadership, that probably now is a good time to go. And *because of the ongoing meetings that we had with them, they were buying into that*. So the advice that we were getting from the province and our own engineers and just what we saw, that was translating into, absolutely, if we were going to pull the pin, they are also. So there are... there is a relationship, and then there is a formal understanding. And the formal understanding is that they make their own law. We just assist them on that. (LG3, emphasis added)

Clearly, the coordination of formal elements of evacuation orders were able to work in this situation due to the work put into building relationships up front. The solid working relationships also open the door for a variety of engagements around a coordinated emergency response for the area that makes new resources available to the system as a whole:

So it's been a very good partnership to the point where...Almost all of our public buildings are in the floodplain. So when it came to selecting a site for group lodging, the Stolo nation came up with a building. So anybody who had been evacuated from this side, would have gone on to Stolo Nation land to be looked after. So it was a fantastic partnership. And it even got to the point where, a couple of the bands own gas stations. And they're in the floodplain. And we kind of had a deal brokered where all of the emergency vehicles could fill up there first and use that advanced area to keep all of our emergency vehicles looked after. And the Stolo nations were quite willing to tell ordinary people who wanted to buy fuel, to go somewhere else. So again it was an excellent relationship. Also very much to their benefit, in as much as most of their people were actually outside the dikes. And they were going to be some of the first people evacuated. (LG3)

The presence of strong bridging social capital across actors—both existing and developed through the process of planning for the freshet—makes more resources available, both because coordination and reassembling of resources in new ways is possible, and because the capacity present here, frees up the capacity of supporting actors (e.g. PEP) to focus elsewhere.

The uncertainty and complexity of flood management—in terms of jurisdictions, institutional context, the nature of flood risk and the many values and interests of actors—requires that a level of flexibility is built into the institutional system at multiple scales. Social capital is a central component of this, particularly in a cross-scale coordination context:

So we end up doing a lot of relationship building and collaborative work with different agencies on the provincial level. Because, as you know, the flood cuts across the lines, it doesn't care what jurisdiction it is. (NGA1)

The approach championed by PEP is a strategic combination of clarifying roles and responsibilities and clearly assigning authorities at different levels, as well as investing heavily in developing and maintaining social capital. This plays out to the extent that, despite having

regulatory authority to compel local governments to be in line with legislation, they choose an enabling role in coordinating across jurisdictions and interests:

[Because of BCERMS], it does work very smoothly. And the one thing that we don't have a lot of ability to do, is if the community isn't as prepared as we think they should be, all we can do is encourage them to be better. We don't have—and nor do we really want to take—a heavy-handed approach...That is kind of how we approach it here...[provide] opportunities and the support that they need to make it happen. (SG1)

In contrast, while DFO has a central role to play in ensuring that fisheries and habitat values are represented in FM, they are often viewed as an obstacle in the process, and an uncooperative one. This was notable in the case study area, given that actors were collaborating successfully on so many other potentially contentious issues. DFO's approach, acting as a "gatekeeper" rather than an enabler, sets up an institutional distance with little flexibility to accommodate multiple interests. It is a dynamic that is seen to be reconcilable, however, through development of social capital:

So we [MOE] are always butting heads with [DFO]. And it takes a long time to build a relationship with them...And the diking authority is the person caught in the middle, between fisheries officers saying, "you can't do that," and the Inspector of Dikes saying, "you have to do that." So there is a lot of work to be done there, and it is very difficult. Because both interests are important. And it usually takes money to solve it. In other words, move the dike back, or put a lot of effort into compensation for the loss of vegetation somewhere else...And diking authorities often don't have tens of thousands of dollars to get studies done, let alone even do anything. So that's a huge thing: building a relationship with the DFO and all their staff. (SG2)

In fact, examples in the case study suggest that building social capital can be very effective at enabling cross-scale coordination even where there are significant distances institutionally, or between different interests. Building on the foundation set by the MOU between FNESS, PEP and INAC, one interviewee posited that the strength of their relationship is possible because

...we've gone through a few campaigns together. The firestorms in 2003, the freshet last year, the forest fires that pop up everywhere during the summer, and then the annual floods. So there's this ongoing relationship and continual refinement of processes and so on. So I think that this helps form a relationship. And you feel part of emergency management: it's a small, tight community" (FNSG1).

This touches on the elements of shared experience, actively learning together, and shared bonding values as touchstones of the developing relationship between INAC and PEP. This enables effective action despite the institutional distance between these actors. In addition, INAC's position is seen as important due to relationships with communities on the one hand, and senior level agencies on the other. This enables translation across these contexts: INAC's role, I would say, was a real partner with the Province. And it was able to be that voice alongside [Stó:lō communities] and the Province. And INAC, having that relationship with the bands for other reasons...than emergency management, could give that update to the province more, maybe, at their level, their language (FNLG1)

Stó:lo communities are also directly involved in PEP-led forums such as the SW PreOC and advanced planning, including weekly or daily conference calls. But it's a new arena for cooperation, and therefore a work in progress. As one interviewee put it, "I think [PEP] were really limited as to what they could provide to us...So I think really we were stepping on new ground through all of it" (FNLG1). For example, there is an important distinction that emerged between Stó:lo community action at a local level, and involvement of senior agencies. At one point in the process, a Stó:lo community was in the process of evacuating unnecessarily. Neither INAC nor PEP had word of this, and the Stó:lo EC, going on word of mouth passed through family networks, showed up on site to assist the community in making decisions about when evacuation might be necessary. There were two connections that facilitated this. First, the Stó:lo EC is integrated locally, as part of Stó:lo social networks. In addition, this individual has an understanding of the Siyam governance system and was able to work with the community through this system to resolve the situation. The Stó:lo EC's understanding of the EM system and connections to other levels was a basis for taking quick and effective action in this situation. However, in ongoing times these supports are not as readily available, which makes it difficult to maintain what had been built and further develop nascent EM systems:

I think that we are still left out of the loop with different governments. It is better than it was before 1999. But really, if you don't keep those consistent meetings, and really connect with those governments that are responsible for emergency management yourself... the relationship is much better, but it is still a work in progress. But we are still moving ahead, I don't think we are falling behind. I think there is slow progress. (FNLG1)

The sense of social capital, or relationship-building, as an opportunity was expressed by many actors in reference to different elements of the FM system. One of the most contentious issues in the case study was the cross-jurisdictional dike situation, between CoC and the communities of Skwah and Shxw:ay. The intractability of this problem comes from the basic level of interdependence between these actors:

...we have seven Stó: $l\bar{o}$  Nations kind of within the boundaries of Chilliwack, so they are mixed all throughout the common people here. So they've kind of got to be on board. A lot of our dikes are on First Nations land as well. So there is kind of a basic relationship from the old days back then. (LG3)

But while the CoC was able to build those dikes decades earlier, they were not able to maintain them due to the Stó:lō communities' exercising de facto authority over their lands. This finally forced the issue of negotiations around the dikes. It is a process that takes time:

But when we sat down over the years to talks to them about [the right of way for a road], all they could see was a benefit to the city, and all we could see was a benefit to them, and wondering why we couldn't reach any kind of agreement. And it just took a couple of years of sitting down and talking and building some kind of a relationship. (LG1)

And the development of social capital is particularly important in a situation like this, due to the power differentials and potential for misunderstanding across groups. Issues such as the historical colonial relationship and presence or perception of racism or prejudice across actors require an authentic commitment to build trust and mutual understanding:

So it takes years, in my experience, it takes years of working at the relationship with individual Bands, to build up the level of trust. And then you can do anything you want, it's possible to work through any problem. But we make the assumption that the world works the way that we think it does, which is that we can put into a document, legally, what our relationship is going to be, and we don't need to worry about working with First Nations. We know that we have to develop relationship and trust, and then the document is secondary to the relationship. It's almost superfluous to what we need to do. (LG1)

The development of social capital to enable coordination across actors is important for collective action in general. With respect to adaptability, it is significant in a number of ways that have been suggested above. First, while formal rules are helpful in creating a framework, the presence of uncertainty requires that actors can coordinate even when that framework doesn't quite fit the problem. In such situations, social capital provides a basis for collective action. Second, development of social capital is an opportunity to manage complexity and the presence of multiple values and interests. Finally, the presence of social capital among actors can enable other types of resources to be redirected towards other areas of the system, or other tasks. Instead of needing to formally coordinate across jurisdictions, good relationships and ability to communicate and work together can do the same job. Relatedly, the development of social capital across actors creates a capacity to act that is distributed across the system. Rather than being reliant on formally structured access to power and resources, a diverse set of actors can function based on accumulated social capital, instilling greater flexibility and redundancy in the system.

## 6.7 Social Learning

The IC analysis suggested that there is a high degree of openness and learning across the FM system, but with variation across subsystems or subgroups. The concept of social learning provides another way of looking at the way that learning occurs in a system and how institutional capacity can contribute to, or hinder, this process. In particular, the idea of "triple-loop learning" is a way of considering not only if learning is occurring, but what type of learning, and by whom. This heuristic was introduced in Chapter 2 (Section 2.2.6).

To illustrate, single-loop learning—"how to do things right"—has a prominent place in the FM system. In EM and SW, monitoring and review are important parts of the process to ensure that agreed upon procedures are followed, and outcomes are acceptable, and to identify problems in advance. However, even this type of learning is afforded differential commitment depending on the actors involved. While formal requirements obligate local authorities to practice and update their emergency plans and regularly monitor and report on structural works, compliance varies and capacity (or will) to enforce the legislation is limited at the provincial level:

So you would think that we should be doing something about those Diking Authorities that are not submitting their reports. Because it is a legal requirement...So we have the powers to do all that kind of stuff, but we haven't been doing it because there's not enough staff...it's well and good to have a law, but the law is no good unless you have someone to act on it, right? (SG2)

On reserve there are similar challenges. While the system is designed to include monitoring and review, other priorities can take precedence. In addition, in the case study area formalized systems of EM were often in formative stages where learning had not necessarily transitioned from individual to social learning. Thus, there was a danger of that new capacity not being available to the system the next time an emergency occurred:

Out of the twenty-three, over half of the communities still have those community members that would know what to do. That we could call on. But if we don't continue to support them, we may even lose them and go back to like in the beginning...And what the Bands, the opportunity is there for them to take individual ownership over their plan. How much support and money in grants they are going to get, I don't know. But they are still wanting to move forward. So that is the best success of all. Is that if there was a huge emergency within the Stolo territory, a lot of the Bands at least have so much more knowledge than they had before 2007. (FNLG1)

Collectively, review sessions were held following the freshet, where actors from across the board were invited to identify lessons learned and ways forward. However, local actors in the case

study area had not seen follow-up on the part of senior agencies, to take that learning forward into action (FNLG1, LG3).

But these very formal dictates around system learning are a very small part of the picture of how IC impacts social learning. The EM and SW systems exhibit different patterns in terms of the way that IC connects to social learning, and the extent to which this translates into 2<sup>nd</sup> and 3<sup>rd</sup> loop levels of learning (Figure 4)

In the EM system, a variety of formal and informal institutional features combine to create opportunities for social learning across the system. Networks and open forums are a standard feature of maintaining and developing the system, and occur at multiple levels in the system. The explicit goals of integration and relationship-building as a basis for effective collective action open up arenas that make social learning possible. In the case study area, this exists through forums such as the CoC's regular emergency planning meetings; PEP meetings; and the Stó:lo emergency planning network. More formal elements such as the MOU, BCERMS and the BC Flood Plan created a consistent context, language, and set of expectations across actors that made it possible for newcomers (in this situation, Stó:lo Emergency Coordinators and communities) to learn how to work with this system relatively quickly. But transitioning from a more individual type of learning into social learning post-freshet is being carried on especially through more informal elements such as the emerging Stó:lo Emergency Coordinators network and community of practice anchored, at the time, by the work going on in the community of Chehalis. This network allows for representatives from Stó:lo communities to learn from each other and with representatives from PEP, the RCMP, FNESS, CoC, the Red Cross and other agencies. As well, non-Stó:lo actors were being exposed, both intentionally and coincidentally, to Stó:lo norms and protocols through forums such as meetings hosted in Stó:lo communities, and an honouring ceremony at the Sumas longhouse, held for all individuals that worked with the Stó:lo during freshet preparations.

This foray into triple-loop learning territory (culture, norms, protocols) is notable, because the BCERMS system and provincial emergency management procedures are designed in such a way that, as long as there is buy-in to that basis, the specifics of it can be adjusted to fit the local context without the need to question the broader system. But the ability of PEP to support the

process in First Nations communities, for example, requires that a degree of two-way learning take place at the level of governance norms and protocols:

But because I think emergency management in the province, in implementing the BCERMS, which is new, that the province is just getting sorted out, in how it they are working with municipalities with the new emergency management program. Let alone even going there, right? With First Nations. So I think really we were stepping on new ground through all of it. So they were really limited and really setting a precedent I think, in working with First Nations on emergency management. (FNLG1)

The presence of a boundary organization like FNESS may facilitate the social learning process, but not necessarily in both directions. So, creating situations such as the honouring ceremony and hosting meetings on reserve may be important contributors to two-way learning.

In contrast, social learning in the SW system was less generalized and more focused around specific sites. Two in particular were notable in this case study: the cross-jurisdictional dike situation, and the FBC/JPC forum.

In the case of the cross-jurisdictional dike, a combination of broader system drivers and local actions seemed to be promoting social learning at multiple levels. At its core, this opportunity arises due to the biophysical and social interdependence across Stó:lō and Chilliwack communities, together with longstanding disagreement and conflict around certain issues:

So we met with them, I went and met with them and said, "This just isn't working for us." I don't know what's happening for your community, but for our community it's just not working...We are neighbors and we have to respect each other. And that Council went into, "well the sewage treatment plant is right next door, so that shows you how much you respect us... and we got into that to and fro, and eventually we decided that we needed a project or two to work on together. And they said, well this dike is a huge irritant. (LG1)

The CoC and neighbouring Stó:lō communities have an ongoing relationship due to this interdependence, and cooperate in many areas. But on this matter, Skwah had chosen to prohibit maintenance from being done on the dike in order to press for the underlying situation to be addressed: "Part of the dike actually runs through reserve, the Skwah reserve. When it was built, many years ago, it left the homes on the Skwah reserve on the wrong side of the dike. Which they're not very happy about. So we have some political problems with actually raising this dike, because we can't get in there to work" (LG2). Taking a firm position in this way has forced a deeper engagement between CoC and Skwah, to resolve the situation. Engaging in joint projects, and the official negotiation process around the dike itself, is one of the ways that a deeper

process of dialogue could begin, resulting in a shift in governance norms: "But we make the assumption that the world works the way that we think it does, which is that we can put into a document, legally, what our relationship is going to be, and we don't need to worry about working with First Nations. We know that we have to develop relationships and trust, and then the document is secondary to the relationship. It's almost superfluous to what we need to do" (LG1). The strategy of "partnership" was mentioned by virtually all interviewees, and is a fundamental piece of governance protocol across levels.

At a system-wide level, it is the FBC and its JPC where opportunities for learning are accessed and developed. Acting as a "boundary organization," the FBC keeps broader system issues (sustainability, basin-wide scale, long-term interests, multiple values) in the discussion and provides forums for actors from all areas of governance (and levels of government) to engage in learning and action: "So they all have their own interests and needs, but I don't know if they would be in a position to extend beyond their own primary interests; whereas, we can enable that to happen" (NGA2). An interesting feature is that this body is linked quite directly to decisionmakers, but has no power of its own. This allows it to maintain spaces for innovation and open exploration, while at the same time connecting to the actors and processes where decisions can be made and implemented:

So we can facilitate dialogue and build consensus at what level around what needs to happen but the actual implementation and delivery occurs or doesn't occur by others. So one local government might say yes, we are going to adopt that approach. Another one might say no we're not ready or another one might say no we just don't have the financial resources. And whether provincial or federal policy changes, is up to them. We can certainly inform those agencies about the consensus that is emerging out of our process. But it is ultimately—it is maybe influence, but not control. On the other hand, that probably helps us to be effective in our facilitation role because we don't have any stick, a regulatory stick to hold over people. So we are in a good position to be an impartial facilitator and create a safe environment for people to come together and discuss issues and hopefully build consensus. (NGA2)

This politically-neutral and collaborative approach allow for a different kind of learning than may otherwise occur. For example:

I think the provincial government would have addressed floodplain mapping as a strictly technical exercise...Whereas the approach we took was to involve local governments and provincial agencies in guiding the approach to floodplain mapping. And hopefully developing some shared ownership of that and making sure that the end products are of the highest use for local governments and that sort of thing...By involving the local government we identified earlier on, the application of the floodplain maps for emergency planning and not just land use decisions. So that was something that we had not anticipated, but because the local
governments were involved they identified it as an important additional use. (NGA2)

This is potentially consequential for the SW system, given that much of the power over agendasetting and distribution of funding is concentrated at senior levels. In this context, the presence of a well-established, respected organization that facilitates collaboration across actors and interests is a valuable asset for deeper learning that is essential for adaptability.

There was some evidence that this may contribute to shifting the management system, but this remains to be seen. Ideas around alternative management schemes exist in the case study area, and are voiced in FBC forums as well as elsewhere. Some perceive of the FBC as an appropriate venue for this to develop into a new governance system:

I was hoping that the Fraser Basin Council would be able to put forward the notion of some kind of proper river management scheme so that we wouldn't have to do this all in... it feels ad hoc. It feels like it's just banging your head against a wall and whoever screams the loudest gets some money... there really needs to be a plan, a proper plan that everyone buys into. And maybe an organization that is the Fraser River Flood Control Association, or something. That looks at all those issues, that has the ability to generate revenues from different sources, and actually make sure that the river doesn't flood. It would seem sensible to me. (LG1)

And in fact the initial work of the Flood Protection Program after the freshet, to develop the governance system around flood management, draws on the years of studies and accumulated wisdom of the FBC (and other groups) in its formulation:

Fraser Basin Council has been a strong leader in flood protection for at least the Fraser Basin, if not for the whole province. So a lot of information is built on their...if you go on their website, you'll see a lot on there. A lot of papers saying that we need a strategic plan, here are the components that we need. And we need funding. So the components for our draft strategic plan for British Columbia, like I say, the work has been done, in many areas. (SG3)

However, the governance system for the FPP is limited to the use of existing mechanisms, due to restrictions demanded by the federal government in return for providing a significant portion of the funding. Despite the presence of learning in the system, there are limited ways to transfer this into action due in significant part to the concentration of agenda-setting and resource distribution powers at senior levels.

So despite calls from various directions, for a more coordinated, strategic approach to river management, there is resistance in the system to enter into this learning loop. The FPP itself is

making funds available for studies, but only those that contribute directly to structural works projects:

The provincial government feels that we've had lots of studies, we've had lots of engineering work, we've had lots of science background. We need to implement in these first couple of years. So we've been really holding the ground on: no broad level management plans, no "what if" kind of science...we want to start with going right into doing something with existing structures. Which is kind of causing people to go, "I don't like that, because we need to have a comprehensive plan for our area that is linked into the next area." There has been a long time without flood investment. So the position of the provincial government has been, we have enough of those reports, pull them out and dust them off. We need to invest in the dikes, invest in the structures. (SG3)

This rather clearly outlines a commitment to single loop learning in the system, consequently diminishing the potential for double- and triple-loop learning. The dedication of funds, and definition of an agenda that excludes exploration of alternative governance or management options, or even an improved understanding of cumulative impacts, diverts time and resources away from the type of social learning that could enhance adaptability in the mid- to long-term.

This is a characteristic of the FM system that is troubling in its implications for longer-term adaptability. As described in the panarchy model (Figure 3), systems are a mix of fast- and small-scale dynamics, along with slow- and large-scale dynamics. In the flood management system, freshet preparation and response is an example of small-/fast-dynamics, while ongoing basin-wide flood management in the context of climate change is an example of large-/slow-dynamics. Each of these scales is integral to system functioning and adaptability, and therefore IC needs to be developed in ways that the entire range of scales can be included in social learning and action processes.

Because of the lack of true integration across the sub-systems of FM (EM, SW, Land Use, Gravel Removal) and lack of a comprehensive frame for FM, it is possible that the effectiveness of EM may reduce the ability of the system to adapt in the mid- to long-term. EM is effective at dealing with uncertainty and complexity during a freshet event. But this capacity is not translating across the FM system to also enhance the ability to deal with uncertainty and complexity through SW or Land Use Planning, or alternatives that could replace these approaches. In adaptability terms, learning and adaptation in the small/short term can actually prevent necessary larger/longer term learning to maintain resilience. This is the type of loop that needs to be broken for fit to be established between institutions and the system properties that are the target of management efforts. Some of the ideas suggested for the changes to governance via the FPP are promising, but it remains to be seen how this plays out, and to what extent design of a new governance system would take the large-/slow-dynamics of the flood hazard into account.

Through a combination of formal and informal institutional elements, social learning is enabled in many respects across the flood management system. The presence of networks and forums for dialogue, alongside more formal structuring elements (MOU, BCERMS, BC Flood Plan) combine to support social learning across actors in the system. Single-loop learning is wellestablished in the FM system, while double- and triple-loop learning, by definition, challenge the status quo and are not necessarily embraced. The position of the FBC as a boundary organization is significant for social learning in a context where the power to act (including to set agendas and distribute resources) is concentrated at senior levels and has significant implications for types of learning that occur. But examples in the case study area also reveal the importance of conflict or divergence as a driver of deeper learning that is critical to system functioning and the ability to adapt in the longer term.

Overall, proficiency in single-loop learning and a focus on small-/fast-scales can take pressure off the system in the short term, but may lead to significant consequences down the road. The FM system shows movement in some important areas, particularly social learning across FN and non-FN actors. But it also demonstrates "lock-in" with respect to the dominance of the SW paradigm and governance structures that ensure this continues. Double- and triple-loop learning is essential to breaking such lock-in in the interests of long-term adaptability.

#### 6.8 Balancing Continuity & Innovation

The final "working piece" of system adaptability, balancing Continuity & Innovation (C&I), connects the adaptability discussion back to its basis in complex adaptive system dynamics. The concept of balancing C&I is an ideal state towards which the other working pieces of adaptability are oriented, and that must be constantly redefined as parameters change over time. It is also through this element of adaptability that the significance of dynamic tensions in a system comes to the fore. Fundamentally, C&I brings attention to the interplay between agency and structure in a socio-political system. In terms of social ecological adaptability, it is also about tensions between flexibility & rigidity, proactive & reactive, tried and tested & experimental and innovative, as well as tension across scales in a system. The point is that these

dynamics are not, and should not, be mutually exclusive; rather, the complexity of a system requires that IC is developed in such a way that a mix of tensions exists in order to locate the system close to the edge of chaos while maintaining its functional integrity. As such, a system never arrives at, or achieves, a state of final adaptability; instead, as a system changes (context, actors, values, connections, etc), so too must the system's IC and the way it is applied.

In this system there are many ways that IC serves to pull the system to one side or another of the Continuity & Innovation balance. The following discussion explores some of the key ways that this is influenced by the IC available to subsystems of the flood management regime, concluding with ways that capacity for balancing Continuity & Innovation is developing in the system.

A characteristic of this flood regime was the differential influence over structuring forces (allocative, authoritative and ideological) by local and senior level governments. This has significant implications for the balance of Continuity & Innovation in the system, and is expressed very differently across the EM and SW systems. In EM, local and senior levels of government typically understand their differentiated roles and are able to act as required under variable circumstances to fulfill their responsibilities. Specifically, local actors are vested with the authority and responsibility for acting, while simultaneously being able to draw on the resources of the broader system to support this goal. As a result, planning and response that is appropriate to local circumstances is made possible, opening up potential for mobilization of existing knowledge and capacity in creative ways. During freshet, this was demonstrated in the way that local actors worked to combine all available sources of knowledge and capacity that could be accessed, in order to effectively prepare and respond to the threat of flooding. But beyond that purpose, this also enabled new opportunities to emerge—for example, Stó:lo communities acting as hosts in the case of evacuations, and diverting fuel sources to emergency vehicle use—and seeds of new systems to germinate—as in the example of the Stó:lo EC combining provincial and local procedures in a novel way to creatively react to an evacuation. These examples highlight how senior levels can direct structuring forces in ways that empower local actors to respond in ways that are innovative and appropriate.

The same dynamic is not seen in the SW system, where governance and funding decisions at senior levels follow more of a "gatekeeper" model than the enabling model observed in EM. During the freshet, the distribution of funding according to criteria determined at a senior level

left little room for creative responses. The reactive distribution of funds on short notice plays into a pattern of standard projects being proposed and receiving funding, with little possibility of creative solutions developing. CoC's approach in this situation was to upgrade plans in advance, and to lobby senior levels until funds were released—politically, this is an understandable and justifiable position to assume. But it also reinforces a reactive approach to flood management, with control concentrated at senior levels. This contributes to "lock-in" as opposed to a dynamic balance between C&I, and was further reinforced in the developing terms of reference for funding and governance under the Flood Protection Program being introduced post-freshet. While the provincial government initially thought of creating a new governance structure, the federal government forced its hand by making funding contributions contingent on the use of the extant governance model (SG3). Moreover, funding available to local authorities was to be restricted to proposals directly connected to a structural works project. This leaves little room for encouraging "out of the box" thinking about development of the flood management system.

Moreover, the analysis of Knowledge Resources highlighted some areas of weakness in the system that have implications for balancing C&I. Some respondents noted types of system information that is being selectively maintained. Particularly, commitment to maintaining long-term and larger scale information (e.g. floodplain mapping, cumulative impacts, hydrological profile) is inconsistent. At the same time, the lack of a comprehensive frame or overview for flood management also contributes to a level of ignorance about system conditions and interdependence that lessens opportunities for proactively dealing with change. While information alone does not guarantee that action will be taken, it is a necessary basis for informed, adaptive choices. The alternative is to continue the reactive course that was seen in the case study period.

Within the FN system, there is also a pattern of project-based funding that undermines the ability of communities to develop capacity in ways that support strategic action. While INAC takes a strategic approach to FM issues, a combination of factors work against strategic action locally. The historical legacy has eroded local institutional capacity (RCAP 1996) and placed reserve communities in sometimes vulnerable locations with little to no structural works infrastructure in many cases. This, together with institutionally defined financial constraints—including the need to perpetually chase project-based funding—mean that FN communities have to go against the grain to act strategically themselves. In the case study area there are examples of ways that

139

communities are doing so, despite these institutional challenges. New opportunities for assuming greater authority over land management are being pursued by at least one Stó:lō community. And the lack of government investment led to local businesses on reserve taking responsibility for funding emergency flood protection projects in a couple of communities.

This is good news for the system in general, because First Nations communities represent a rich source of social memory and innovation potential that has not been expressed to full effect in the flood management system to date. Other levels of government have the potential to act in ways that open pathways for these resources to inform and enhance the institutional capacity of the system as a whole. INAC's role in connecting communities to the provincial EM system is an example of how greater local responsibility can be accompanied by support that allows for capacity to develop in new ways. The emergence of the Stó:lō Emergency Coordinators network during and after freshet is an example of institutional capacity being built through this process, in a way that is linked to the broader system. In an ongoing context, there are further capacities present in Stó:lō communities that may provide alternative possibilities to the entrenched frames in the system currently. For example, First Nations communities often have first-hand knowledge of what it takes to be resilient as a community:

...to have feasts, this is something that is just generational, to give up everything you have, to share it, to share everything that you have in your home. That's very cultural. I find on some very ironic levels, First Nations are much, much better, and more resilient, when it comes to facing large-scale disasters, than non-Native communities. They are used to living in a state of disaster for generations. They are used to not having much to rely on, and not having very good infrastructure, or power that goes off on a regular basis. Bad water, contaminated water, poor sewer systems. The things that we take for granted and that we absolutely need...So it's interesting, the resiliency of First Nations communities... (NGA1)

Rather than only seeing the vulnerability side of the equation, there is an opportunity to recognize, support and benefit from this capacity to turn challenge into resilience. In addition, the close relationship of Stó:lō to the river provides for alternative views of the relationship between humans and the river system, and corresponding management approaches that may be desirable, as described in section 6.5 (Sensemaking).

Freshet and Ongoing contexts provide different opportunities for contributing to the balance of C&I. In panarchy language, the potential of ongoing situations is to make progress on this balance in terms of larger, slower dynamics in particular. For example, processes of relationship-

building and negotiation that can reach deeper levels of frames, paradigms and interconnection across actors require years of investment and work. In turn, that type of groundwork can then serve as a strong foundation for collective action in a short, intense event, and to support leaps forward during the "window of opportunity" created by a crisis event like freshet. For example, at a local level the years of investment in relationship-building by CoC and Stó:lō communities made collaboration possible in the short period of freshet preparation. That solid base also supported the pooling of local resources and strategies in novel ways so that the region as a whole was better able to respond. On the other hand, freshet combined with a number of other factors to create the potential for movement in the system that is unlikely to happen at other times:

Like I said we got our emergency response plans upgraded a great deal. Well, why weren't they in place already? There are other things that you've got to do. There are various piles on my desk screaming at me, and it's hard to work on something that may not happen for 10 years. Or it may happen next year. So whether or not that stays the same, depends on -- last year several things came together. The flood profile got raised, all of a sudden everyone woke up to the fact that the dikes were too low. [Hurricane Katrina's impacts in] New Orleans really gave everybody an idea of how bad it can get. And then we had the high water warning. So it was one factor in a whole series of things. Everyone just sat up and went "oh, what was that"? So whether that level of interest can be sustained I'm not sure. Certainly we're going to maintain our level of interest, but whether other decision-makers do or not... (LG2)

Freshet was widely recognized by respondents as an opportunity in this respect, creating momentum for improvements and directing resources and political will at outstanding challenges.

In the sense of adaptability, it is important to be prepared to take advantage of these types of "windows of opportunity" when they arise, as well as identifying or creating such windows outside of crisis events. The "strategic positioning" strategy by the CoC is a notable example of proactively creating capacity to act effectively in a range of potential situations. Development of social capital and alternative institutional forms in ongoing times is a key way that this is occurring in the case study. And networks that are able to link to, or create new sources of, the power to act are a notable asset in the region. For example, the Stó:lō EC network represented a process of building capacity locally while at the same time working to develop connections to provincial, regional, and federal partners to enable that process. The FBC/JPC has demonstrated its ability to generate new forms of funding mechanisms, partnerships, types of information and studies that also inform new institutional mechanisms like the FPP. Notably, the retreat by the

BC Government from some flood management functions has created a space for the FBC to develop novel ways of fulfilling some of these gaps. Finally, various strategies in response to the shifting landscape of First Nations / non-First Nations relations in BC have served to create or take advantage of this window of opportunity. This includes deliberate engagement by the BC government in projects of consequence for First Nations communities; Stó:lō communities alternately taking more open or closed stances towards negotiation and partnerships with other government actors; or INAC and PEP taking a more enabling approach to forge pathways between First Nations communities and other actors.

Overall, aiming to balance C&I leads to an appreciation of the centrality of diversity in the pursuit of greater adaptability. Making space for tension between seemingly contradictory forces is a central concern. For example, the EM system demonstrates the benefits of an enabling role at senior levels of government, to support creative local responses. But "gatekeeper" or "blocking" roles also drive innovation—there is a time and a place for both sides. Likewise, conflict and vulnerability are not inherently negative phenomena; rather, it is what is done with these forces that is important. Where conflict can lead to opportunity for learning and incorporation of new strategies and knowledge, and where the experience of vulnerability drives actors to draw on and express their capacity to manage resilience, adaptability can be enhanced. Particularly, this case has shown that typically marginalized actors can be sources of, largely untapped, memory and innovation potential.

The interplay of long- and short-timescales is another key consideration for balancing C&I. Maintaining information over the long-term enables actors and system processes to adjust and be proactive. This goes hand in hand with the capacity of the system to take advantage of, and to create, windows of opportunity. Especially important in this respect, is the role of leadership at all levels of the system to act as a counterbalance to the stabilizing force of institutions. In this case, key political decisions largely reinforced the existing institutional framework, cutting off potential for innovation. To ensure ongoing adaptability, the goal is to exercise power that is informed by an understanding of system conditions and trajectories of change, in order to continually review, challenge and renew ways of seeing and doing.

### 6.9 Conclusion

Overall, the institutional capacity analysis suggests that the flood management regime is resilient and adaptable to the flood threat in the short-term. In the mid- to long-term, there are important components of institutional capacity that enhance the potential for adaptability, but there are also fundamental barriers to adaptability that derive from its institutional capacity and that may render other improvements moot.

Some of the central institutional capacity features that enhance adaptability of the system include:

- The presence of divergence and diversity across the system, that is connected in various ways to institutional processes for decision-making
- Examples of "learning systems" and collective "sensemaking" repertoires within the flood management regime that contribute directly to adaptability and can serve as models for broader system processes
- Ongoing commitment to partnerships and relationship-building, and the maintenance of forums for its development.
- While it is not distributed equally across the system, social capital improves the system's ability to deal collectively with change and the nature of the flood hazard
- Effective information management systems (with exceptions). Specifically, local and traditional sources of knowledge were integrated in ways that contributed to institutional innovation and learning.
- The presence of key change agents in roles where their skills and vision can be communicated or implemented
- Clear articulation of authorities, roles and responsibilities of different actors, supported by social capital
- The ability of local level actors to act strategically, including the capacity to develop alternative routes to, or locations of, the power to act
- Transitions in current institutional arrangements in response to a variety of pressures, demonstrate existing flexibility and resourcefulness of institutional arrangements
- Ability to engage with deeper frames
- Presence of boundary organizations

There are also a number of important ways that institutional capacity forms a barrier to adaptability. For example:

- Dominant frames reinforce decision-making that is at odds with the nature of the flood hazard and the implications of ongoing or abrupt changes. The overriding belief in structurally-driven flood management is institutionally ingrained and locks the system into a maladaptive feedback loop
- The proficiency with which the EM system operates can skew system adaptability towards short/fast cycles, contributing to neglect of slow/large cycles that underlie broader system resilience
- Therefore, while there are pieces of system understanding contained in SW and EM institutions, the lack of integration across these and other elements of the FM system may, nonetheless, contribute to system failure
- Funding for flood management reduces flexibility and adaptability of the system, as it is largely directed into sunk costs of structural works. This reduces the capacity of the system to change direction and consider alternatives, as well as enabling increasing populations and property to locate in areas of flood risk.
- In contrast to the demonstrated flexibility of institutional arrangements to support freshet actions, in an ongoing context there was inconsistent support to enable appropriate action at a local level.
- The challenges of engaging with deeper frames, and keeping long-term and big-picture perspectives central to decision-making
- Decision-making processes that give political judgment undue influence relative to judgment based on understanding system state and processes

A number of elements identified in the institutional capacity analysis threaten to undermine the potential for adaptability of the system if they are not addressed. The analysis has also identified many mechanisms and elements existing in the current flood management regime that are contributing to adaptability currently, and could be leveraged to shift the regime into a configuration that can maintain its resilience in the long-term. The final chapter will review these issues and present suggestions for policy that could contribute to enhancing adaptability through development of institutional capacity.

### **Chapter 7: Conclusion**

#### 7.1 Return To The Research Questions

The broad research question explored in this study is: **How does institutional capacity enhance and/or hinder the current, and ongoing, adaptability of the flood management regime?** This was pursued through four sub-questions. Each of these is discussed below, reflecting the key points to emerge from the study.

# How can we assess the contribution of institutional arrangements to system adaptability, in practice?

This question was explored by constructing an adaptability framework composed of eight key elements identified in the literature. Next, institutional analysis approaches were reviewed in order to identify one that was able to look specifically at institutional qualities of significance for intergovernmental processes, in a context of change and evolution of the system itself. The Institutional Capacity framework of Healey and colleagues is used, particularly because change, adaptation and resilience are part of the basic model of institutional capacity. Part of this is the way that the IC framework is built on a characterization of the dialectical relationship between external and internal forces, and an understanding of the mutually constitutive basis of institutions and actors. There is much common ground between Institutional Capacity and adaptability approaches arising from their recognition of complex, adaptive system dynamics in the social and ecological systems they study; thus, their parallel interests in elements such as networks, interdependence, dynamic tensions, diversity, collaboration and learning.

Accordingly, this framework is useful for pulling out some significant elements of IC that play into adaptability of the system, and for teasing apart some of the overlapping dimensions of institutions and adaptability to form a clearer picture of how these relate to adaptability dynamics. Importantly, it allows for clearer insight without sacrificing the sense of complexity of engaging with a systems problem. Its principal drawback is the degree of detail required to satisfy the full intent of the conceptual and analytical framework. That degree of detail is beyond the scope of this thesis, and the data set, to fulfill. Nonetheless, the analysis provides helpful insights into the ways that this framework can be applied to a real case, and the dynamics of adaptability when viewed from a sociological/collaborative planning perspective. This application demonstrates that the use of the IC framework and concepts is compatible with exploration of adaptability. In some ways it is actually overly compatible, leading to repetition and excessive redundancy. For example, the Information Management feature overlapped extensively with the category of Knowledge Resources. It would be helpful if the purpose of Information Management in promoting adaptability of the system was integrated into the Knowledge Resources category, but Information Management is probably not needed as a separate adaptability lens. Likewise, the category of Relational Resources could be enhanced to encompass Social Capital's role in adaptability. Subsequent application of this framework would benefit from upfront consideration of ways to integrate adaptability concepts into the IC framework to avoid extensive repetition and overlap in the analysis.

Developing methodologies of complexity requires a language of complexity to simultaneously emerge, which is currently limited. What is wisdom? Sensemaking? Resilience? Dynamic tension? The edge of chaos? Emergence? Panarchy? Adaptive cycles? And what do abstract concepts look like on the ground? How do they apply to my life, my communities? Predominant frames limit the ability to hear and make sense of ideas and concepts that exist outside of preconceptions or understandings of how the world works. Many of the concepts involved in adaptability, describe phenomena that the English language is not well equipped to articulate.

With respect to the adaptability framework itself, understanding of how the eight features relate developed over the course of the study. Figure 18 presents this visually. Beginning from the centre of the diagram, the features of Diversity and Social Capital are key resources that filter through the four mechanisms in the middle ring, to direct the system towards an ideal balance of Continuity & Innovation, near to the "edge of chaos". As well, the pieces are interrelated in a process of feedbacks. For example, Social Capital is both a potential product of Social Learning, and an input into further Social Learning (Armitage et al. 2008). Where the line between the adaptability features exist is hard at times to distinguish, rather it is the emphasis of each that is distinct and that adds something to understanding system adaptability. These features do not all contribute uniformly in a positive direction to adaptability; rather, they also exist in dynamic tension.



Figure 17. Adaptability Framework

Adaptability is a moving target and there is no formula for achieving it. If one believes they have achieved it, by definition they are already beginning to lose it. One of the questions this raises is, how can people collectively become more comfortable being with uncertainty and the recognition that change is constant. The thought that society will never actually reach a point of completion, but are engaging in a constant process of beginnings. How do people draw on what is, and what has been, to continue to be able to see, make sense, and act on this reality? How can society and individuals harness information, knowledge, experience, and relationships, and turn this into the type of wisdom that can sit equanimously with opposites and tensions, and find a path through to adaptive action?

# In what ways does institutional capacity vary across sub-systems of the flood management regime in this case study?

Chapter 5 outlines the IC available to, and developing within, the flood management regime, and contrasted this by subsystem. This highlights specific institutional capacity elements that impact functioning of the system.

The contrast between the EM and SW system is stark, revealing core differences that influence the way that IC is drawn on and developed. At one level, this is recognizable in the network structure and operation, where the EM system takes a generally enabling and supportive approach, while SW's structure has a regulatory and gatekeeper orientation. This has implications for the distribution of the power to act, and different actors' ability to access the power to act, across the subsystems. A major difference is the degree of dependence on financial resources to maintain the current approach to SW, while EM functioning is not tied so tightly to large amounts of financial capital. The IC analysis highlights the way that these approaches are defined both concretely (e.g. through guidance documents) and in the ways that this manifests in different cultures, practices, types of relationships, approaches to knowledge generation & sharing, and paradigms.

Key elements that distinguish IC in the EM system from that of the SW system are the presence of a system-wide perspective, and the centrality of relationship-building and integration institutionally. The shared frames available to EM actors provide a basis for independent and collective action. In the SW system, the current paradigm does not include a comprehensive, coordinated or cumulative perspective on flood or river management, and there are a variety of views on appropriate ways of governing this. As well, the emphasis on relationship-building and integration in EM, especially through dedicated forums and active networks, was not seen in SW.

So while EM demonstrated ongoing development and integration that was very visible in the ways that FN and non-FN systems were coming together, the shifts occurring in the SW system were less visible. In SW, reconfiguration seemed to be occurring in some cases, but at deeper levels. Changes in IC were occurring as different actors, arenas and repertoires were brought into play, such as relationships around the cross-jurisdictional dike, and shifts in FM governance from the MOE to EMBC/FPP.

The EM system models active, visible, learning processes that are enabled by the factors mentioned. The silo approach to knowledge management and coordination of SW impacts the ability of actors to work collectively and strategically, and to stay responsive to changing conditions. Interestingly, the EM system is designed to not be reactive even though its core concern is short-term response. In contrast, the SW system is reactive, due to reality that it revolves around availability of funding which tends to be tied to political will generated as a result of critical flood events or threats. While institutionally peripheral, the FBC/JPC provide a unique alternative perspective on approaches to river management that seems particularly important for the SW side of FM.

Contrasts between the Local and Senior levels of government revolve particularly around their positions relative to authoritative, allocative and ideological structuring forces. These differences

are defined from the top-down, giving senior levels principal control over agenda setting and resource distribution, while local levels work within that system and simultaneously develop improvisational tactics that can shift power into their sphere of influence. A diversity of tactics exist within the system, arising from the differences in roles, responsibilities and powers at local and senior levels. The base contrasts across levels are also expressed in the differential reliance on codified and more informal forms of IC.

The system shows a tendency to integrate generalized information and specialized expertise with place-based knowledge across levels. However, the concentration of resource access at senior levels translates into gaps in ongoing or large-scale information in the system, a situation that is vulnerable to changing political priorities by the provincial government. On the other hand, local levels demonstrate the ability to leverage knowledge available locally and through links with senior levels, aided by involvement of key individuals. And the FBC is a place for collective knowledge, visions and priorities to be held and develop, despite shifts or conflicting priorities at other levels that are linked directly to political cycles.

Across First Nations and non-First Nations systems, the case demonstrates some of the widest gaps and, correspondingly, greatest potentials for development of IC. This contrast draws attention to the deeper levels of IC and learning, and the combinations of formal and informal IC features that make collective action and IC development possible.

This contrast particularly highlights the impact of the historical institutional legacy on current IC, and ways that it is developing. The different potentials in terms of power to act that derive from delegated authorities for FN and non-FN communities draw attention to the ways that relationships across levels of government have developed and how these have been codified in laws and procedures. Examples such as the barriers to independent action on emergency SW for Stó:lō communities that do not affect CoC, provide a poignant illustration of how IC is available, and develops, differentially for different groups. But the lower IC for FN communities in certain respects is only part of the picture, as constraints are also driving innovation, challenges to the status quo and mobilization of assets in new ways.

Interaction across FN and non-FN systems also brings to light the longer and deeper scales of IC, and how these interplay with more direct and recognizable elements of IC. The presence of the

149

*New Relationship* document, for example, is symbolic of a deeper change in the approach to engaging across FN and non-FN actors. It is an "object" that makes the ongoing process (also evident in the presence of Court rulings, exercise of de facto authority/withdrawal, and negotiation and relationship-building processes) more recognizable. The potential usefulness of standard frames that are broadly culturally appropriate came through in how BCERMS integrated with local EM systems. But at the same time, conflicting frames emerges as an important IC feature mediating the process of collective action, for example driving the need for long-term negotiation and relationship-building in the case study area.

Finally, comparing IC in freshet and ongoing situations emphasizes the way that different contexts can enable IC to be drawn on and developed in ways that address multiple needs and goals in the system. The restructuring of IC during a crisis demonstrates the capacity of the system to mobilize political will, and associated resources and support, as well as the potential for diverse actor groups to act on connections over divisions. There is a time and place for different types of learning, and different levels of mobilization and investment. Freshet demonstrated the power of a perceived opportunity for driving action and development across subsystems; the period immediately following also highlighted the challenges of transitioning from this peak into lasting momentum in an ongoing context. While the FBC is marginal during freshet, its work in ongoing times is a resource and foundation for the flood management system.

#### What implications does this variation have for adaptability of the system?

As outlined at the end of Chapter 6, the IC features highlighted in the contrast across subsystems are serving to both enhance and hinder adaptability in different circumstances.

Some of the central institutional capacity features that enhance adaptability of the system include:

- The presence of divergence and diversity across the system, that is connected in various ways to institutional processes for decision-making
- Examples of "learning systems" and collective "sensemaking" repertoires within the flood management regime that contribute directly to adaptability and can serve as models for broader system processes

- Ongoing commitment to partnerships and relationship-building, and the maintenance of forums for its development.
- While it is not distributed equally across the system, social capital improves the system's ability to deal collectively with change and the nature of the flood hazard
- Effective information management systems (with exceptions). Specifically, local and traditional sources of knowledge were integrated in ways that contributed to institutional innovation and learning.
- The presence of key change agents in roles where their skills and vision can be communicated or implemented
- Clear articulation of authorities, roles and responsibilities of different actors, supported by social capital
- The ability of local level actors to act strategically, including the capacity to develop alternative routes to, or locations of, the power to act
- Transitions in current institutional arrangements in response to a variety of pressures, demonstrate existing flexibility and resourcefulness of institutional arrangements
- Ability to engage with deeper frames
- Presence of boundary organizations, and marginalized groups

There are also a number of important ways that institutional capacity forms a barrier to adaptability. For example:

- Dominant frames reinforce decision-making that is at odds with the nature of the flood hazard and the implications of ongoing or abrupt changes. The overriding belief in structurally-driven flood management is institutionally ingrained and locks the system into a maladaptive feedback loop
- The proficiency with which the EM system operates can skew system adaptability towards short/fast cycles, contributing to neglect of slow/large cycles that underlie broader system resilience
- Therefore, while there are pieces of system understanding contained in SW and EM institutions, the lack of integration across these and other elements of the FM system may, nonetheless, contribute to system failure
- Funding for flood management reduces flexibility and adaptability of the system, as it is largely directed into sunk costs of structural works. This reduces the capacity of the

system to change direction and consider alternatives, as well as enabling increasing populations and property to locate in areas of flood risk.

- In contrast to the demonstrated flexibility of institutional arrangements to support freshet actions, in an ongoing context there was inconsistent support to enable appropriate action at a local level.
- The challenges of engaging with deeper frames, and keeping long-term and big-picture perspectives central to decision-making
- Decision-making processes that give political judgment undue influence relative to understanding of system state and processes

Overall, the system demonstrates the institutional capacity to manage variation and change reasonably well in the short-term, and within limited bounds of flood hazard variability. However, the barriers outlined above add up to major challenges when the view is extended to the mid- and long-term. These dynamics contribute to increasing the overall flood risk and lock the system into a maladaptive cycle that could lead to a significant disaster if not addressed.

As it is currently practiced, the FM system in BC is a predominantly structural approach. While EM is well developed, it is mainly seen as what happens when flood management (i.e. structural works) fails, as opposed to part of an integrated approach to managing risk, uncertainty, complexity and interdependence around the issue of flooding. Likewise, land use planning in floodplains was seldom recognized as a significant part of flood management in the case study area, despite having an official place in the province's "Integrated Flood Hazard Management" program.

The institutional dynamics outlined in this study illustrate how the system continues to reinforce this paradigm. Despite the general agreement that coordination needs to be improved in some way, this typically refers to the need to coordinate the structural works system and there is little to no discussion of alternatives. In addition, the ongoing investment in floodplains and structural works perpetuates the lock-in of the structural paradigm. The presence of dikes affords residents, users and investors a sense of protection and security. The growing concentration of people and investment located in floodplains is supported by a policy environment that gives the "cue" that this is appropriate. It may even contribute to a sense of entitlement to protection, for example as a result of the practice of the provincial government providing disaster financial assistance when

properties in floodplain areas are flooded, despite the fact that they are not responsible to do so under section 15 of the *Disaster Financial Assistance Regulation*. As a result there is a disincentive for either local governments, residents or investors to develop an awareness of the risks, let alone to pursue alternatives to the status quo.

Moreover, the effectiveness of the EM system may enable this approach to continue. This can be seen in the sense of the interactions between large/slow cycles and small/fast cycles. An effective EM system is critical to maintaining resilience of the system; however, where EM can act proficiently to take pressure off of the system on shorter time scales (i.e. by averting major impacts to the community in the case that flooding does occur), a byproduct is that it reduces the perception of the need for more fundamental changes. In combination with other factors, this can contribute to a maladaptive system. In a sense, this echoes the point made earlier: while the community of Skwah's stance of refusing access to the CoC to do maintenance on the dike creates risk of dike failure, it has been an important part of driving deeper changes in the relationship. Likewise, funding cuts to the MOE threaten to leave the system without critical information, but at the same time this led to development of new partnerships and capacity in the system. In other words, sometimes it is the pressure or constraint that creates opportunity for core change to happen.

It is accepted at all levels that a massive amount of funding should be directed towards building higher and better dikes, and that if flooding is to occur, large amounts of money should be made available to those who are affected. Once spent, this money is a sunk cost that further reinforces the idea that communities will or should be protected, and therefore will or should receive more funding prior to, or as a result of, the next flood threat. Yet, the irony is that there will never be enough money to complete even those projects that are currently identified, let alone any changes required. To pour such large amounts of money into fixed capital that serves the single purpose of (hopefully) blocking water from going in certain directions, breeds rigidity and lock-in. It might even feed a greater sense of commitment to maintain the status quo, to justify such large investments. While there are other justifications for this practice, there is virtually no adaptability benefit to the system as currently practiced<sup>33</sup>.

<sup>&</sup>lt;sup>33</sup> Whether this results in a disaster also depends on the magnitude and direction of change and variability in Fraser River flows. For example, if flow decreases then a disaster may not result, but a vast amount of resources will have been locked up unnecessarily, making them unavailable for other uses. If flow increases, then the institutional system is contributing to increasing risk as well as maladaptiveness.

If change is to occur, it will depend on political action at senior levels. This is where the core legal, financial and governance levers are located. Currently, this concentration of power and resources at senior levels provides little incentive or power locally, to drive a redefinition of appropriate flood management.

But that is not to say that there is a lack of institutional capacity to enable shifts to a more adaptable system. As outlined above, there are a wide range of IC assets in the case study area that do, or could, enhance adaptability. In particular, the power of diversity comes through strongly in the case study, and suggests an alternative framing of what are commonly referred to as "vulnerable populations" in disaster management and planning literature. As argued by Frances Westley in the context of social innovation (Westley 2008), engaging vulnerable populations can be an opportunity to integrate important sources of diversity that are otherwise marginal to official governance processes. In the case study region, First Nations communities are in some of the most vulnerable and precarious circumstances relating to flood risk. But they also contain some of the most relevant aspects of IC for developing adaptability, and demonstrate the ability to mobilize this capacity in interesting ways. Not despite, but partially as a result of, the ongoing challenges that they face, First Nations respondents have first hand experience of what it takes to be resilient. And as holders of social memory and potential sources of innovation, Stó:lo communities can contribute in important ways to developing a more adaptable system. This will depend on how the shifts across FN and non-FN systems progress, and the extent to which integration may occur, as opposed to assimilation.

Overall, this analysis brings out the importance of valuing and holding space for tensions to exist in the system. It is from this dynamic balance that true adaptability can emerge.

# In what ways can public policy foster institutional capacity in ways that enhance adaptability?

At a general level, public policy could better foster IC for adaptability by integrating an adaptability lens into policy-making processes at all levels of government. Developing the capacity for "adaptability thinking" or "resilience thinking" in individuals, organizations, and systems is a necessary step on the path to developing IC that will continue to enhance adaptability. Understanding system dynamics allows for judgment calls to be made about how to

support an effective balance of structuring and innovating movements in the system. This also means valuing diversity, tensions, divergence and the process of learning at least equally to other interests like efficiency.

This must also be built into institutional processes so as to transform ways of doing business into active learning and sensemaking systems. Inquiry and reflection should be built into the system long-term, as well as in response to crisis events. For example, establishing a permanent organization charged with evaluating existing flood management and investigating, proposing, and piloting alternatives. Reframing of "vulnerable populations" as "sources of memory and innovation" is a compelling idea for transforming IC.

Likewise, policy processes can be designed to encourage and integrate a diversity of elements such as actors, ideas, perspectives, repertoires, techniques and types of knowledge. Boundary organizations and combinations of formal and informal institutional capacities make unique and effective contributions in this respect. In particular, the connection between DFO and provincial/local actors in flood management seems as though it would benefit from efforts to build relationships and find common ground. The combination of clearly articulated roles and responsibilities, as well as ongoing investment in social capital building, is effective for integration of other areas of flood management. Relatedly, there may be a role for greater involvement of civil society and other groups in governance of flood management.

Specifically, for IC to shift from supporting maladaptive behaviour to more adaptive actions, a number of dynamics should be reconsidered. Taking a sober look at choices around funding for flood management is an important component of this, including the investigation of potential alternative financing possibilities rather than relying on senior levels of government to fund megaprojects. One respondent commented that small, strategic works enhance resilience, adding that resilient flood management "is all about learning. About securing new investment; securing new working, effective partnerships; learning new ways of doing same job; and about doing the job" (FNLG2).

Much greater effort will be required for the system to live up to its title of "Integrated Flood Hazard Management," and this especially demands that frames are revisited. The dominant structural paradigm in flood management limits the system's ability to perceive alternatives as plausible options. Ideas exist and many more could be incorporated, but there is currently little space for this dialogue to occur. Creation of forums for such dialogue that are more directly linked to decision-making may be one way of moving forward. Also, the IC present for EM could be better linked to ongoing times; for example, through a bridging organization concerned with mitigation.

A major weakness in the domain of Knowledge Resources was the attention to maintaining and developing information at all necessary scales, in order to have a reasonable understanding of system conditions and trajectories. Many pockets of knowledge exist, but are not necessarily accessible in a coordinated form. Drawing on existing knowledge, particularly from groups who are typically marginalized, holds potential.

Senior levels have more control over structuring forces while local levels show strength in their ability to improvise, experiment and innovate. Despite the fact that a fair bit of authority has been delegated to local levels, capacity to effect significant change is limited by structuring forces at senior levels. Issues such as the impact of systemic financial constraints (and particularly project-based funding) on the ability to take strategic action locally, are obvious places to start to consider how to better use the resources and other structuring forces at senior levels to support the potential at local levels, similar to what was seen for EM during the freshet.

As well, the influence of political priorities on flood management decisions (especially at senior levels) needs to be reconfigured to better reflect a balance with understanding of system conditions and trajectories. One suggestion from a respondent is to create an arm's length management authority modeled after the Agricultural Land Commission in British Columbia.

#### 7.2 Strengths And Limitations Of The Research

The main contribution of this study is to provide an example of how one might operationalise a research problem that seeks to explore the relationship between institutions and system resilience or adaptability. In addition, the case study provides specific insight into real-world policy issues in the case study area that can serve as a tool to practitioners interested in building adaptability in this or other areas of decision-making.

A strength of the research is the way that it bridges diverse areas of study, and attempts to be comprehensive. It draws on what each area offers, presenting a new perspective on how one might assess the contribution of institutions to system adaptability. And it anchors this conceptual exploration to a practical case with real-world implications.

The ambitiousness of the study is one of its strengths, but also a limitation. The project has developed a detailed conceptual and analytical framework that can be used to explore the problem, and proved useful as a guide to high-level analysis. Satisfying the full intent of the analytical framework would require further resources, expertise and data collection.

And yet, the study necessarily draws boundaries around the case of interest, which limits its scope to a subset of the FM system (SW and EM only), which itself is a subset of the River system. In order to do justice to a systems problem, it would be preferable to work as part of a team that could each contribute a piece of the overall picture.

In terms of research methods, time spent doing field work was limited. The study may have been improved by spending more time immersed in flood management functions with the various levels of government. In particular, not enough time was spent building relationships as a basis for the research, which particularly limited access to perspectives of Stó:lō community representatives.

#### 7.3 Areas For Future Research

As mentioned, this study looked at only one part of the FM system, which is only one dimension of the many interrelated systems that comprise the River basin. A true system perspective would recognize that FM is just one element of river management, and work towards understanding the diversity of other values in the basin, how interactions across values are dealt with institutionally, and the implications of this for adaptability. The proposed framework would allow for this broader perspective to be explored. More simply, extending this analysis to include gravel removal and floodplain land use management would complete the FM system and provide a more complete picture of its adaptability. As well, governance extends beyond governmental actors to include civil society, the private sector, citizens and so on. Such a perspective would complement this study's focus on intergovernmental IC. This study was also limited in its ability to explore the deeper levels of knowledge systems, governance culture and power relations. These levels are emphasized in Healey et al.'s extension of the Institutional Capacity framework along the dimensions suggested by Lukes' (1993), as well as being reflected in the idea of panarchy, as the slower and larger cycles that often go unrecognized. Going further into these deeper dimensions of IC is a critical undertaking that would shed light on, and support, sensemaking and social learning to effectively manage resilience in the mid- to long-term.

The decision to take a process-oriented look at institutions and adaptability was in part to fill a gap that was recognized in the literature. But there is still a great need to provide baseline studies of the physical and ecological adaptability status of the flood management and river basin systems. Studies of the costs of alternative, more adaptable approaches to flood management would also aid in ongoing consideration of options for the region (e.g. Vis et al. 2003).

The current study provides a baseline against which future studies could judge the trajectory of adaptability in this system. Future studies could compare this snapshot with what evolves in the coming 5-10 years. In retrospect, was the freshet 2007 event a trigger for changes that enhance or constrain adaptability of the system? Is adaptability improving or falling behind, relative to the patterns identified here?

Another interesting area that was raised by this study is the relationship between institutional capacity, risk perception and action. What types of institutional qualities and capacities promote ongoing sensemaking and proactive approaches?

Developing the language of complexity and how to communicate these ideas could still use a lot of work. Which concepts are understandable to practitioners, citizens and decision-makers, using what language? How might the language of resilience and adaptability develop to convey the complexity of phenomena in a simple and understandable way? What other languages (besides English) have ways of expressing complexity?

And more broadly, this line of inquiry raises fundamental questions of justice and power in decisions about resilience. Pursuing an adaptability agenda implies choices about what should be

made resilient or adaptable. How does adaptability relate to the issue of justice or equity? And is it desirable to enhance the resilience of the system as it is today? What elements *should* be made resilient, based on what criteria or process? Who should decide?

### 7.4 Conclusion

Overall, the system demonstrates the Institutional Capacity to enhance adaptability of flood management in the region. Serious commitment to unlocking the maladaptive cycles that the system is now stuck in is necessary to ensure adaptability over the mid- to long-term. This will particularly require that paradigms around flood management, its goals and how it is funded, are questioned and explored. The Fraser Basin Council is an example of the type of boundary organization that can facilitate social learning, social capital building, and sensemaking for a more adaptable intergovernmental system. As well, the reframing of "vulnerable populations" as sources of memory and innovation could unlock new momentum and pathways for innovation. There are many examples of adaptive processes at work in the system currently. The challenge remains for partners inside and outside of government to leverage these and other assets in ways that will build a long-term, adaptable flood management regime in the Fraser Basin.

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## Appendix A: Freshet 2007 Timeline

Date	River Levels at the Mission gauge	Province	City of Chilliwack	Stó:lō First Nations
Last week of January			Risk Assessment is performed to determine what actions are necessary	
			Emergency Management plans are consulted and updated	
January 26, Februar y 7		Central Coordinating Group meetings held		
Februar y 1		MoE issues a snow bulletin suggesting significant potential for flooding		
Late Februar y			Chilliwack's Emergency Coordinator begins identifying and involving stakeholders and partners. Coordination meetings begin.	
Februar y 28 – May 29		Heightened readiness activities; Advanced Planning Units in place		
Early March		The province requests applications from local governments and diking authorities, identifying critical flood protection measures to mitigate the spring freshet risk.		

Date	River Levels at the Mission gauge	Province	City of Chilliwack	Stó:lō First Nations
March 8		First regional local government preparedness conference calls held		
March 14		Provincial advisory issued		
March 22			Weekly coordination meetings begin. The various agencies involved are asked to keep the City up-to-date on their own activities. Agencies bring their organizational plans for flood response, which are constantly updated with new information shared at the meetings	Stó:lō representative invited by the City, to sit on the emergency response committee at the City of Chilliwack
March 26		Province approves \$2 million in funding for the City of Chilliwack to upgrade critical sections of the east dike.		
March 27		First Flood workshop		

Date	River Levels at the Mission gauge	Province	City of Chilliwack	Stó:lō First Nations
March 31		Announcement of \$33 million in funding for emergency flood protection projects. Approximately half of this amount is already distributed, to 51 projects around the province. Applications are still being accepted from communities.		
April 4		Province announces an additional \$1 753 000 for dike upgrades and erosion protection for the City of Chilliwack		Initial meeting held between eight Stó:lō communities around Chilliwack, to review state of current emergency response plans. Some communities do not have a plan.
April 16				Meeting to outline training for communities. It is decided that training should be provided
April 19				A training program is presented at a meeting hosted at Seabird Island and attended by representatives from INAC and the Province. This is an opportunity for communities to ask questions about support and funding. The Stó:lō Nation emergency coordinator offers to extend training to all communities.

Date	River Levels at the Mission gauge	Province	City of Chilliwack	Stó:lō First Nations
April 21		Province announces that the entire \$33 million in funding has been distributed to a total of 87 projects.		
April 26				At a meeting, communities begin identifying emergency coordinators. Presentations about the 1948 flood are made. A local Chief who experienced this flood shares his knowledge with community representatives.
May 3		Federal government announces \$16.5 million in funding (half of the \$33M already dedicated by provincial government) for emergency flood protection projects.		
May 2		PEP hosts a flood preparedness workshop in Abbotsford, for local authorities. Municipalities and First Nations communities attend.		

Date	River Levels at the Mission gauge	Province	City of Chilliwack	Stó:lō First Nations
May 3 – June 1				Ten training sessions are held for all interested Stó:lō communities. Emergency coordinators are being trained to be able to train their own community members.
May 4 – May 24				Six "all communities" meetings held in various locations. Some are attended by outside parties (FBC, INAC, FNESS and PEP attend the May 4 <sup>th</sup> meeting). Emergency coordinators are identified, information shared, and plans updated.
May 9		Province announces the purchase of portable diking technology (gabions), a first for the Province.		
May 16			City of Chilliwack holds a Town Hall meeting at a local highschool. Attendance exceeds capacity, and a second meeting is held the same evening to accommodate more people.	Communities are designated to host reception centres and/or group lodging in the case of evacuations. Community emergency plans are finalized.

Date	River Levels at the Mission gauge	Province	City of Chilliwack	Stó:lō First Nations
May 17			City of Chilliwack holds a Town Hall meeting at the Prospera Centre (hockey arena). Attendance over the two nights totals around 4000 people.	
May 22		Province announces the establishment of a toll-free flood information line, in multiple languages, to ensure that the public can access information about the flood threat and response.		
May 28- 29		Provincial Advisory issued; response phase begins		
May 28 – June 2		ESS Director Training offered through the Justice Institute of BC. Three coordinators from Stó:lō communities are invited to attend, in addition to municipal staff.		
June 1		Province issues a livestock relocation notice, allowing eligible agriculturalists to access funding to relocate dairy cattle in areas at risk of flooding.		

Date	River Levels at the Mission gauge	Province	City of Chilliwack	Stó:lō First Nations
June 2	4.4 m	BC Environment issues a High Streamflow Advisory for the Lower Fraser River.		
June 4			The City of Chilliwack advises First Nations communities of a pending evacuation alert by the City.	Shxwha:y Village and Skwah discuss evacuation alerts at a meeting at Skwah, attended by 5 communities.
				All coordinators meeting is held at Skwah to discuss evacuation plans. Large attendance.
June 5	5.3 m		Chilliwack declares an evacuation alert for areas outside of the dikes only. Forty homes are affected.	Shxwha:y Village and Skwah issue evacuation alerts.
		Daily conference calls between PEP, Municipalities and First Nations communities are initiated.		Shw'ow'hamel evacuates the entire community. Stó:lō emergency coordinator visits the community. The community decides to rescind the evacuation order and establishes a method to determine when evacuation is necessary, according to the Siyam system.

Date	River Levels at the Mission gauge	Province	City of Chilliwack	Stó:lō First Nations
June 5 – 6				Emergency diking constructed at Shxwa:y Village, paid for by a local business. Emergency diking measures also taken at Cheam.
June 6	5.6 m		City of Chilliwack begins relocating non-essential files from City Hall, which is in the floodplain.	Residences at Chawathil and Shw'ow'hamel are sandbagged, supported by Forest Service volunteers.
June 7	5.7 m		Reception Centre is established	Meeting to prepare for evacuation in the case that the gauge reaches 6.3 m at Mission. Tzeachten and Yakweekioose establish group lodging.
June 8	5.8 m			
June 9	5.9 m			
June 10	5.96 m			
June 11	River crests at 6.01 m			
June 12 – June 20				Three coordinators meetings and training sessions held.
June 21		Meeting held between PEP, SW PreOC, INAC, and First Nations community representatives to identify "Gaps and Best Practices" from freshet response		

Date	River Levels at the Mission gauge	Province	City of Chilliwack	Stó:lō First Nations
July 19		All coordinators meeting, along with Chief and Councils, INAC, and PEP, to review lessons learned from the freshet preparation and response.		
July 19				Honouring ceremony held at the Sumas Longhouse. Coordinators, emergency teams, volunteers, and supporting organizations/individuals (Province, Federal, Municipal) attend. Stó:lō presents certificates to their supporters and individuals central to the freshet preparations.
July 25			Meeting between First Nations and municipalities held to debrief on the freshet experience (hosted by provincial govt?)	
Fall 2007		Provincial ESS coordinator invites First Nations representatives to attend a mock emergency exercise in Delta.		

Date	River Levels at the Mission gauge	Province	City of Chilliwack	Stó:lō First Nations
Decemb er 2007		Two major projects by the City of Chilliwack are funded by the Province: \$300 000 for relief wells, and \$360 000 for erosion protection. A report to Council outlines the findings of a scenario modeling project completed by a consultant for the City of Chilliwack. The scenarios illustrate flooding in the case of three hypothetical dike breaches.		
Spring 2008		The Province announces \$650 000 for additional relief wells to be built by the City of Chilliwack.		Chehalis has held two mock exercises to practice their emergency response plan. Other communities are invited to attend.
Fall 2008		Province and Federal government announce \$16 million in new funding for flood protection projects. The City of Chilliwack receives \$230 000 for relief wells.		

Sources: PEP (2007); GOC (2007); interviews; news releases

## Appendix B: Formal Rules, annotated

## **B.1 Canadian Constitution**

The Canadian constitution sets out the areas of jurisdiction for the federal government and the provinces. Federal legislative authority consists of specific matters set out in Section 91 (e.g. taxation, navigation and shipping, sea coast and inland fisheries and Indians and lands reserved for Indians), as well as anything not specifically assigned to the provinces. Sections 92 and 93 of the act define the exclusive jurisdictions (i.e. legislative authority) of the provinces, including education, health, natural resource and land management, municipal entities, direct taxation for provincial purposes, and local works (Department of Justice Canada, undated). As well, recognition of aboriginal rights was added to the Constitution Act in changes made in 1982. Section 35 states: "The existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby recognized and affirmed" (Department of Justice Canada, undated).

The authorities set out under the constitution may be delegated to other levels of government, as the province does with municipalities, principally through the *Local Government Act* in British Columbia.

Although aboriginal rights were enshrined in the Constitution in 1982, what those rights entail is still being defined through the court system. Aboriginal title was specifically recognized as a unique aboriginal right in the 1997 *Delgamuukw* decision. This and subsequent cases have established a duty to consult meaningfully with First Nations where activities could be irreconcilable with Aboriginal claims to a particular area (INAC 2007b, 2007c). In British Columbia many First Nations do not have existing treaties that clarify rights, title, and sometimes provisions for self-government. Some comprehensive land claims are currently being negotiated, including one by seven Stó:lō Nation communities. Many communities are not in the negotiations process with the province and federal government, including Skwah and Sxwha:y Village, near Chilliwack (MARR 2007).

Sources: Department of Justice Canada, undated; INAC 2007b; INAC 2007c; MARR 2007

## **B.2 National**

#### **B.2.1 Public Safety Canada**

#### **B.2.1.1 Disaster Financial Assistance Arrangements**

When costs for response/recovery exceed what can reasonably be covered locally or provincially, the federal government can reimburse the province for disaster-related expenditures. This program, administered by Public Safety Canada may also provide advance funding for reconstruction of major infrastructure that is taking place through provincial disaster assistance programs.

The DFAA does not constrain provincial spending; rather, it outlines which costs will be eligible for cost sharing with the federal government. Disaster financial assistance may be requested by a

province or territory when expenses exceed \$1 per capita for the province/territory. New guidelines were introduced in January 2008, which specify what expenses are eligible for cost sharing and how this will be administered. The cost sharing formula was not changed.

**Sources:** Public Safety Canada website: "Flooding in British Columbia: The Role of the Government of Canada" <u>www.publicsafety.gc.ca/prg/em/bc\_fld-eng.aspx</u> (2008-01-17); PSC website: "Disaster Financial Assistance Arrangements—Revised Guidelines" <u>http://www.publicsafety.gc.ca/prg/em/dfaa/index-eng.aspx</u> (2008-08-07)

## **B.2.1.2 Emergency Management Act**

The federal *Emergency Management Act* may make INAC's responsibilities towards First Nations communities for emergency response more concrete; however, exactly what those implications are is still being determined. Until now, for example, community emergency management plans were not legally mandated. The new Act may obligate INAC to ensure that communities have and exercise plans and have access to necessary training, as outlined in Section 6

(1) The emergency management responsibilities of each minister accountable to Parliament for a government institution are to identify the risks that are within or related to his or her area of responsibility — including those related to critical infrastructure — and to do the following in accordance with the policies, programs and other measures established by the Minister:

(a) prepare emergency management plans in respect of those risks;

(b) maintain, test and implement those plans; and

(c) conduct exercises and training in relation to those plans.

Sources: Emergency Management Act (2007)

## B.2.2 INAC—Indian and Northern Affairs Canada

## B.2.2.1 Indian Act

S. 81: local councils may make bylaws relating to health

Aside from treaty negotiations, the federal government, primarily through the *Indian Act*, "has the responsibility to act in a fiduciary capacity with respect to aboriginal peoples. The relationship between the Government and aboriginals is trust-like, rather than adversarial, and contemporary recognition and affirmation of aboriginal rights must be defined in light of this historic relationship" (*R. v. Sparrow*, 1990). As the body primarily responsible for managing this responsibility, INAC's role is complex. Its functions with respect to First Nations include:

- negotiating comprehensive and specific land claims and self-government agreements on behalf of the federal government
- overseeing implementation of settlements
- promoting economic development
- delivering "provincial-like" services (e.g. education, housing, community infrastructure, social assistance and social support services) with the goal of providing access to services that is comparable to what is available to other Canadians

- fulfilling the Crown's lands, revenue and trusts obligations
- matters relating to First Nations governance
- providing training initiatives.

It works largely in partnership with First Nations, who administer around 85% of INAC's funding, and describes its role as increasingly one of a facilitator between First Nations and "interests" (INAC 2007a). Other descriptions of INAC's functioning are less judicious, for example this quote from the National Chief of the Assembly of First Nations, Phil Fontaine, in April 2000: "DIAND, like the Government of Canada itself, suffers from a schizophrenic personality. It holds and administers fiduciary obligations to our peoples at the same time as it must observe its political obligations to the rest of Canada. ... It advocates one moment on our behalf and in the next moment, through the Justice Department, against us" (quoted in Hurley, 2000). Adding to the complexity, Indian reserve lands are federal lands (Department of Justice, undated).

Sources: R. v. Sparrow, 1990; INAC 2007a; Hurley, 2000; Department of Justice, undated

## B.2.2.2 INAC—BC Region Strategic Plan (2007-2010)

INAC's BC Region has highlighted Emergency Management planning as one of its key strategic priorities for 2007 – 2010. Its stated objective is to "provide coordinated emergency management assistance and resources to First Nations in partnership with the Province of BC," which will be measured by the number of First Nations with Emergency Response Plans (INAC-BC 2007). Of note, this measure is technically included within the health portfolio of First Nations governance bodies already; it's just not being specifically funded or enforced.

Sources: INAC-BC 2007

### **B.2.2.3 Flood and Erosion Protection Funding Prioritization (INAC BC)**

In the lead up to the 2007 freshet, INAC-BC invested \$3.3 million into urgent mitigative works on reserve. Since 1999, INAC-BC has dedicated between \$2.5 and \$3.5 million annually to flood protection and mitigation works, for a total of \$33 million. This is a current policy; however, the spending is budgeted each year and may be re-directed to other areas that are a higher priority at the time. INAC-BC performed a review and risk assessment of First Nations flood and erosion protection in 1999, determining that approximately \$230 million was needed to complete all identified projects. This list is being addressed gradually, and is ranked based on risk criteria developed and applied by INAC-BC. These criteria include factors such as degree of potential damage; impact on economic development, infrastructure or other assets; amount of warning time; emergency access impacts; depth and duration of flooding, etc.

**Sources:** "Freshet 2007: Standard Operating Guidelines between Indian and Northern Affairs Canada, First Nations' Emergency Services Society and Provincial Emergency Program"; INAC (1999?) "Flood and Erosion Damage Mitigation Plan" *Appendix B: Matrix Guidelines and Sample Forms*.

## B.3 Joint National-Provincial

#### **B.3.1 Joint Emergency Preparedness Program (JEPP)**

The JEPP is a federal cost-sharing program that aims "to enhance the national capability to manage all types of emergencies and ensure a reasonably uniform emergency response and recovery capacity across Canada." Under JEPP, a certain amount of funding is earmarked for each province by the federal government each year. Also, a "Regular Fund" may finance additional projects, subject to a nationally competitive selection process to fulfill other national priorities. Projects must be submitted to a provincially-established JEPP committee, which reviews applications according to criteria maintained by PSC and submits its selections for final approval to PSC. Approved projects may be funded through the allotted share for the province, or through selection under the "Regular Fund." Local governments and First Nation reserves can apply through their respective province. Projects may include training, equipment, planning and capacity building, among other things.

According the the Public Safety Canada website, "To be eligible for Government of Canada funding, JEPP projects must:

- have a clear objective that supports priorities aimed at enhancing the national, provincial and territorial emergency response capability;
- have an agreed, identifiable beginning and end;
- include a statement of the nature and extent of federal involvement and take into account how federal participation will receive visibility and recognition;
- include a provincial or territorial commitment to the project through funding or in-kind contribution."

**Sources**: PSC website "The JEPP Process" <u>http://www.publicsafety.gc.ca/prg/em/jepp/pro-eng.aspx</u> (2008-02-05); PSC website "Joint Emergency Preparedness Program" <u>http://www.publicsafety.gc.ca/prg/em/jepp/index-eng.aspx</u> (2008-02-15).

### **B.3.2 MOU Between INAC/FNESS and PEP**

The federal government and the province of B.C. signed an agreement to include First Nations communities in the province's emergency response process. Under this agreement, the Provincial Emergency Program (PEP) is designated as the agency that will provide emergency response services and administer disaster assistance to reserve communities—where there is an imminent threat to life or property PEP may act immediately, and where the threat is less urgent PEP will work through INAC to determine what actions will be taken. Notwithstanding, INAC retains ultimate authority for emergency management for First Nations communities.

Local authorities in B.C. are legally required to follow the British Columbia Emergency Response Management System (BCERMS) model. Non-treaty Bands in B.C. are not bound by provincial law; however, to facilitate service provision within the PEP program, INAC-BC and FNESS use the BCERMS structure. The federal government finances disaster assistance for First Nations. Because of the MOU, First Nations prepare and submit their own claims to PEP, and PEP administers claims and payments for First Nations in the same manner as for local authorities in the province.

**Sources**: PEP "BC Flood Plan 2007"; PEP (2007) "Financial Assistance for Emergency Response and Recovery Costs - A Guide for BC Local Authorities and First Nations"; FNESS (undated) "First Nations Emergency Services Guide to Emergency Planning"

## B.3.3 Freshet 2007: Standard Operating Guidelines (INAC BC-PEP-FNESS)

These guidelines were developed in the advanced planning stage for the freshet 2007 season. The document outlines roles and responsibilities of the three parties and how they will coordinate and communicate during the emergency response. This specifies that FNESS will play the role of consultant to communities in the advance planning stage, and work closely with INAC during a response event.

Sources: INAC-BC (2007) "Freshet 2007: Standard Operating Guidelines"

## **B.4 Provincial Government**

## **B.4.1 Various Legislation Affecting Local Governments**

### **B.4.1.1 Local Government Act**

The Local Government Act gives authority to local governments for the majority of flood management decisions, but does not obligate the local government to take particular actions such as designating floodplains or zoning the land appropriately, for example (Lyle 2005). Relevant sections include:

- section 910: zoning in a floodplain
- section 546-7: regarding dike construction/maintenance
- section 798.1: emergency powers

Sources: Lyle (2005); Local Government Act (1996)

## B.4.1.2 Land Title Act

Section 86 of the *Land Title Act* addresses subdivision in an area that may face a flood risk. It grants the approving officer the power to refuse a subdivision in such an area, and the power to require a covenant or professional report stating that the intended use is safe, as a condition of subdivision approval.

Sources: Land Title Act (1996)

## B.4.2 Ministry of Aboriginal Relations and Reconciliation

## **B.4.2.1 New Relationship**

There are important connections between First Nations and the provincial government, and as unsettled land claims exist in much of B.C. this is a particularly undefined domain. In 2005, the provincial government and First Nations set out a "New Relationship" arrangement founded on "respect, recognition and accommodation of aboriginal title and rights." This document also included an agreement to "establish processes and institutions for shared decision-making about the land and resources and for revenue and benefit sharing..." (Province of B.C. 2005).

Check the FN Summit website for their perspective on where the "New Relationship" is at

Sources: Province of B.C. (2005)

## B.4.3 Ministry of Environment:

#### **B.4.3.1 Integrated Flood Hazard Management**

In British Columbia, the provincial government takes an "Integrated Flood Hazard Management" (IFHM) approach that aims to "reduce or prevent injury, human trauma and loss of life, and to minimize property damage during flooding events" (Ministry of Environment 2007). This broad goal is addressed through three focus areas: dike safety, land use management and emergency management. The province provides a "hierarchy of documents" to steer flood management, in the form of legislation, regulations, strategies, plans and guides (PEP 2007b)

Sources: Ministry of Environment (2007); PEP (2007b)

### B.4.3.2 Dike Maintenance Act

The Dike Maintenance Act is the main legislation governing structural flood works in B.C.. Under the Dike Maintenance Act, any alteration to, or impacting on, a dike requires approval by the Ministry of Environment, as does construction of a new dike. Proposals must conform with the "Dike Design and Construction Guide: Best Management Practices for B.C., July 2003" and meet a number of other requirements such as consideration of environmental impacts and consequent effects for existing structural works and flood risk to others. Approvals may also be required under the *Water Act, Land Act, Forest Act, Canada Fisheries Act, Canadian Environmental Assessment Act, Canada Navigable Waters Protection Act,* and other legislation or bylaws.

**Sources:** <u>http://www.env.gov.bc.ca/wsd/public\_safety/flood/dma\_approvals.html</u>, Accessed 10/11/10

## B.4.3.3 Flood Hazard Statutes Amendment Act (2003), and Miscellaneous Statutes Amendment Act (2004)

These acts amended and repealed elements of various existing statutes, to reflect a change in the approach to diking and land use management for flood hazard areas. The affected Acts are: *Dike Maintenance Act*; *Drainage, Ditch and Dike Act*; *Land Title Act*; *Local Government Act*; *Ombudsman Act*; and *Municipalities Enabling and Validating Act*.

Key changes included the granting of authorities to local governments respecting floodplain bylaws and exemptions; authority for approving officers to determine subdivision requirements without ministry approval, and the ability to regulate dikes.

**Sources:** Government of B.C. (2004) "Bulletin: Miscellaneous Statutes Amendment Act (No.2), 2004"; Government of B.C. (2004) "Bulletin: Flood Hazard Statutes Amendment Act, 2003"

## **B.5 Provincial Emergency Program**

## B.5.1 Emergency Program Act 1996

This is the central legislation pertaining to emergency management for the province of B.C.. The Act outlines duties and powers that may be exercised by the Provincial Emergency Program and its Minister. It specifies responsibilities of local authorities, including direction and control of their own emergency response. Local authorities are required to produce an emergency plan under section 6 of this act, and to establish an emergency management organization to develop and implement these plans, among other things. The municipal council or its head is the only local authority who can declare a state of local emergency. The Act grants the power to establish and administer regulations governing disaster financial assistance.

\* Chapter 2 in "Introduction to Emergency Management in B.C." provides full summary of roles, powers, authorities of each level of government involved in emergency management.

#### **Emergency Program Management Regulation 1995**

This regulation outlines the powers and duties of the Provincial Emergency Program, Ministers, and Government Corporations under the *Emergency Program Act*. It also specifies that an Interagency Emergency Preparedness Council must be established, to coordinate across government agencies. The institution of BCERMS (see below) fulfilled one of the requirements outlined in this regulation.

#### Local Authority Emergency Management Regulation 1995

This regulation specifies the requirements of local authorities with respect to the content and exercising of emergency management plans and associated training, information and procedures needed to support implementation of the plan in the event of an emergency.

#### Compensation and Disaster Financial Assistance Regulation

This regulation provides the authority for B.C.'s program to provide disaster financial assistance to those who have experienced disaster-related property damage. This is administered by PEP, on behalf of the Minister of Public Safety.

Complementing the law and regulations, the Provincial Emergency Program provides a variety of guides and guidelines for carrying out emergency management duties, including:

- Guidelines for declaring a state of local emergency
- Emergency Operations Centre Operational guidelines
- Operational Guidelines for evacuations
- PEP Financial Assistance Guide

**Sources:** JIBC and PEP (2005) "A Guide to the Emergency Program Act"; *Emergency Program* Act (1996); *Emergency Program Management Regulation (1994); Local Authority Emergency* Management Regulation (1995); PEP (2006) "Introduction to Emergency Management in B.C.".

#### B.5.2 BCERMS—BC Emergency Response Management System

The British Columbia Emergency Response Management System (BCERMS) is an approach adapted from the Incident Command System (ICS) model used by various U.S. states. BCERMS is a framework for standardizing and harmonizing emergency management services across functional areas and levels of command. The system includes: a clear organizational structure, enhanced communication, a multi-level response structure, standards, common technology, mandated training, distributed forms and other publications.

**Sources:** PEP (2000) "British Columbia Emergency Response Management System: Overview (Interim)"

### B.5.3 BC Flood Plan 2007

For the specific case of flood hazards, emergency management and the associated functions of river forecasting and monitoring, training and communications are well established in B.C. and enshrined in the BC Flood Plan 2007 (PEP 2007a). This document outlines the methodology of the province for its coordinating role in emergency management.

Sources: PEP (2007a)

### **B.6 Emergency Management British Columbia**

### **B.6.1 Emergency Freshet 2007 Funding**

In the lead up to the 2007 freshet, the B.C. Government made \$33 million available through the Ministry of Public Safety, for urgent flood works. This was a one-time, short-term injection due

to the gravity of the potential flood threat that season. The Minister is authorized to procure funds for this type of action from the consolidated revenue fund, in accordance with section 16(1) of the *Emergency Program Act*.

Sources: Emergency Program Act

## B.7 Joint Provincial-Regional/-Local

## **B.7.1 Partnership To Develop Flood Hazard Management Tools and Resources**

In 2003, following the amendments to flood hazard management legislation introduced in May, a partnership was formed between the Fraser Basin Council, provincial government and local governments. The intent of the partnership was to develop tools and resources to contribute to flood hazard management in the Basin, to which the province committed \$1 million. This is just one of the ways that the Fraser Basin Council is involved in collaborative work across levels of government on flood hazard management in the Basin. It also hosts the Joint Program Committee on flood issues, and provides ongoing support and advocacy on behalf of its partners.

**Sources:** Fraser Basin Council (2003) "Fraser Basin Council Announces New Partnership to Develop Flood Hazard Management Tools" News Release, July 9, 2003.

## **B.8 City of Chilliwack**

### **B.8.1 Chilliwack Official Community Plan**

The Official Community Plan is the basis for a long-term vision for the community, stating its objectives and policies for guiding decisions about land use and planning within the local government's authority. Of note, section 1.5 addresses aboriginal relations and confirms the importance of pursuing relationships, discussions and agreements for mutual benefit while recognizing the autonomous jurisdiction of First Nations over their lands.

In addition to confirming the importance of maintaining and upgrading the dike system, the Plan mentions some specific policies for managing the flood hazard:

- Initiate and manage municipal flood protection measures for the Fraser River.
- Identify flood protection measures with Provincial agencies that are appropriate for the Fraser
- Valley.
- Develop residential design guidelines for areas affected by the 200-year flood.

Sources: City of Chilliwack (1998) "Official Community Plan"

# B.8.2 Bylaw No. 3560: A Bylaw to Provide For a Comprehensive Emergency Program

This is the legal authority for establishing a local emergency management organization and program, as mandated under the *Emergency Program Act*. It describes the composition and procedures for the local emergency organization, and specifies that the emergency plan will be designed in accordance with the BCERMS principles. The local emergency bylaws provide an interface between the EMO and other municipal departments or agencies. This bylaw also enables negotiation of mutual aid protocols with other local authorities or governments.

Sources: CoC Bylaw No. 3560; JIBC (2005) "Introduction to Emergency Management in B.C."

#### B.8.3 Fraser River Flood Plan 2007

This is an emergency plan specific to the Fraser River flood hazard for Chilliwack. It outlines the emergency program that is to be implemented in the case of an impending flood threat. This plan was updated for 2007 by Chilliwack's emergency coordinator, in cooperation with other agencies and partners.

#### B.8.4 Floodplain Regulation Bylaw 2004, No. 3080

This bylaw lays out requirements for developments in the floodplain, and exemptions to those requirements.

## **B.9 First Nations Communities and Tribal Councils**

#### **B.9.1 Internal Governance System**

Many of the rules that govern First Nations decision making are not publicly available in a written form. In general, elections for Chief and council are held every three years. Many communities still maintain traditional governance systems, such as the Siyam system in some Stó:lō communities.

Regional councils, notably the Stó:lō Nation and Stó:lō Tribal Council, also play an important role in decision making and administration of services in the area. Communities may affiliate with one or none of these councils, for a variety of reasons. In the emergency situation of the freshet, there was broad cooperation among Stó:lō communities regardless of political affiliations.

### **B.9.2 Band Council Resolutions**

Band Council Resolutions (BCR) express the will of the elected council and are used to facilitate various cross-governmental actions. While Bands do not have the legal authority to issue an evacuation order, the issuance of a BCR is an established step in the process to enable evacuation actions to be taken (i.e. legal authority is with INAC). Similarly, BCR's are commonly issued in order to recognize that another agency is welcome to enter the reserve and assist in emergency response on the Band's behalf.

### **B.9.3 Emergency Plans**

Some communities, such as Chehalis, have developed an emergency plan. Other communities may not have a plan at all, or may possess a "cookie-cutter" plan, usually provided by a consultant. There is no statutory obligation for First Nations communities to either possess or exercise an emergency plan (although the recent *Emergency Management Act* may change this—see section 8).

## B.9.4 First Nations Land Management Act / Framework Agreements (e.g. Shxwha:y Village, Squiala, Tzeachten)

This Act enables Bands to apply for approval to institute their own land code and assume management of their own lands, even in the absence of a treaty. This may open up various options for Bands in terms of flood management options. Shxwha:y Village has had its own land code since 2006. During the flood preparations of 2007, an emergency dike was constructed by a non-aboriginal business located in their territory—this may have been possible due to the FNLMA changes.

**Sources:** First Nations Land Management Resource Centre (2007) "Framework Agreement on First Nations Land Management" Accessed 10/20/08 at <a href="http://www.fafnlm.com/content/en/index.html">http://www.fafnlm.com/content/en/index.html</a>