

Vulnerability to Climate Extremes in the Americas Project
(VACEA)

Governance and Policy Assessment (Unit 1C)

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1. Executive Summary

The institutional context of governance is a fundamental determinant of the adaptive capacity of rural agricultural producers and their communities to adapt to climate change and respond to drought and flood (Adger et al., 2009; Willems and Baumert, 2003). Unit 1C of the VACEA project evaluated the governance and policy context in relation to the adaptation of agricultural producers and the events of drought and flood.

After a review of secondary sources (institutional mandates, laws, policies, and instruments applicable to agriculture, drought and flood), seventy interviews were conducted with local governance institutions in the VACEA study areas and a further twenty six semi-structured interviews were conducted with key informants in the provincial and federal governance system relating to agricultural producers, local communities, droughts and floods.

Some of the main themes and findings which emerged were:

Risk and Climate Change

Interviewees acknowledged that the climate was changing, and fast.

“The fact is the climate is changing. The climate has always changed; it just is changing a heck of a lot faster than we believe it ever did in history and second of all never in history have we been as socially vulnerable as we are now to climate change.” (C4)

With this changing climate, the number of disasters is increasing; the costs of responding and also increasing.

The vulnerability of people and communities is increasing because of:

- More development and the reduction of natural barriers to flooding;
- Increasing numbers of finished basements in houses;
- Increasing technology and items which can be damaged being housed in basements;
- Continuous residential building in flood zones.

Emergency planning is steeped in the management of “risk.” However, risks are something which occurs in the short to medium term, not the long term. Emergency planners examine, “what are the threats, what are we facing, what communities are we going to have to help through bad times this spring, this summer, or this forest fire season, or this winter” (S4, 2013). Long term trends relating to things like climate change don’t come up generally. For instance, the person who made the decision to build the dike around Winnipeg to stave off flood waters was described, “the guy who did it took a huge political hit and people were just laughing at him for years until the waters rose and then they weren’t laughing anymore” (C8, p. 9).

Educational and Institutional Support

Responsibility for local disasters, including flood and drought reside with individuals and local communities. A process of escalation occurs depending on the magnitude of a disaster. In Canada, floods, are considered emergencies, or disasters. Droughts are severe, but have recently been taken off of the Canadian disaster database. Because of this, it is debatable that drought continues to be regarded as a “disaster.”

Although the province recognized responsibility for assisting communities with planning, providing training and education, and in the case of escalated disasters, assistance to the communities, the federal government has withdrawn from in its role in this regard. As a result, a reduction of institutional capital is occurring, which is increasing vulnerability:

- Most significant is the closing of the Canadian Emergency Planning College in Ottawa which provided federally subsidized training for emergency planners all across Canada.
- In the mid-1990s flood plain mapping was disbanded by the federal government due to budget cuts.
- In the past few years Canada has withdrawn from both the UNFCCC and the International Covenant on Desertification.

The federal government provides meteorological and hydrometric data through mechanisms such as “Drought Watch” and the services of Environment Canada and NACIS (National Agri-climate Information Service). The federal government (Public Safety Canada) also provides a platform – or “secretariat service” - for emergency and disaster people to exchange information and ideas, but at their own expense.

Concerns were expressed in many interviews over the state of research in the federal government and research funding including:

- Numerous closures of weather stations over the last number of years;
- Gaps in weather and environmental data;
- Problems in creating and accessing good information for planning;
- Federal government units and employees having to compete for funding of research;
- The hiring of technicians in relation to water roles, not engineers;
- The downsizing of the federal government in relation to agriculture and environment.

Flood plain mapping was being carried out by the federal government previously. This activity was discontinued by the federal government in the mid-1990s. However, disaster tend to refocus efforts. After the High River Flood, the federal government issued a tender for flood plain mapping.

The federal government used to have a fully funded emergency preparedness college in Arnprior, Ontario. This then was transferred to Ottawa; eventually it was scaled back so the federal government only paid 50%, and now the college has been closed. Education and training for emergency planning has become a local and individual responsibility.

The amount being paid out by the federal government in relation to disaster assistance has been increasing exponentially over the last decade. From 1970-1996 payments were on average 13 million per year. From 1996-1998 payments ranged from 15 to 110 million per year. In 2011 it was 300 million and it appears to be approximately 600 million per year over the next few years.

Response to Actual Events

The response to the High River Flood in Alberta demonstrated strong social capital in the numerous volunteers who assisted after the disaster. However, the institutional response was somewhat uncoordinated. The “incident command response” model is the adopted method of planning and response. This method designates one unit (fire, police, etc.) in charge of the event and other organizations are directed by this unit. Regardless of this plan for the management of the flood, residents complained of a lack of coordination and disparate actions by various actors (including the RCMP breaking into homes and seizing guns).

Immediate response (small monetary support, accommodations in schools etc.) was favourable, but insurance and disaster payments characterized as often protracted in negotiation and very different in magnitude between adjusters.

In respect of drought, the 2001 water sharing arrangement by Alberta irrigators was thought a strong social and institutional response. This situation was researched in the IACC project, and again covered in VACEA interviews. There is some concern that this water sharing arrangement has not been fully integrated into institutional memory and may not be repeated in the event of another drought.

Emergency plans are often on a shelf and not accessible at the time of an emergency. During the High River incident several communities were wiped out and could not physically respond (let alone locate their plan!). Emergency planning suffers from its own technical bureaucracy. Because emergency planners tend to have a technocratic, specialized view of emergency and risk, their plans are often created without public consultation and reside in a medium that is not accessible and sometimes not even known about by others. These plans often don't account for climate change, but view events of “risk”, droughts and floods and something wholly within the realm of the emergency planning field. This sentiment further exacerbates the disconnection of emergency planning from the public and stakeholders and results in an inability to engage the public in exercises testing emergency planning and building readiness and resilience in the face of emergency.

This disconnect between emergency planning and the community is also exacerbated by the critical incident command system, and the increasing overlap of issues of “security” with emergency response. The paradigms of “security” and emergency response, which might arise in the case of a terrorist event, and the response to an emergency event which is a natural disaster like a flood, are very different. Open communications, community involvement and engagement, all necessary for building resilient communities are not goals of emergency planning in relation to terrorist events, but reside in the same technical bureaucracy of emergency planning.

Insurance

Insurance is not a holistic, reliable instrument to reduce vulnerability of people and communities to the extreme events of drought and flood.

Flood insurance is not available to private individual home owners in Canada. Commercial flood insurance is available to businesses but the cost is based on location. During the High River Flood homeowners might have been able to access insurance if they could argue their sewer backed up prior to overland flooding (and they were lucky enough to have this type of insurance).

The federal government provides a disaster relief program which flows through the province to residents. Flood events, such as the High River Flood, are highly politicized events with many photo opportunities of attending the community immediately after the event and providing the funding to rebuild. However, the impact of these events on the community are permanent, because of the patchy availability of disaster relief programs and insurance. Many small business people and community members who rented apartments are unable to recover and move elsewhere.

Crop insurance is a viable tool for a farmer who can afford it (usually medium to large farmers). However, many small farmers cannot afford it. A suite of agri-stability programs exist to stabilize the income of agricultural producers and reduced yields as a result of extreme events.

Learning

Much has been learned about emergency planning as it has been part of the Canadian institutional landscape for over 100 years.

However, a pattern has occurred over the last thirty years of having a disaster (usually a flood in Western Canada), preparing a report, shelving the report and never implementing the report. The following floods occurred, reports were prepared and filed with government, and no action taken:

- 1995 Southern Alberta

- 2004 Calgary and Lethbridge flood

- 2005 For MacMurray, Peace River and Edmonton south

In one case, Medicine Hat, after the 1995 flood, the city moved people out of flood zones and build a park and golf course.

Interviewees were inconsistent about whether climate change science has been incorporated into emergency and community planning. Local watershed groups have played a role in planning for extreme events and climate change.

Adaptive Governance

Information collected from the interviews and secondary sources were analysed in respect of the characteristics of adaptive governance (explained in section 3.3). Based on this analysis the following was concluded:

It is evident that there is a highly evolved, complex institutional structure which assists agricultural producers and local communities respond to extreme weather events of drought and flood. This system is highly responsive immediately after a disaster such as flood. Support in the weeks and months following a flood, however, dwindles. As drought is a creeping disaster, it is responded to more by the informal governance institutions which are coincident with, and buttressed by a strong local community social capital. There is also a significant governmental institutional capital available to allow agricultural producers (who can afford to) to plan and prepare for an extreme event of drought via government programs.

The governance system in relation to droughts and floods is lacking in reflexivity. There is a gap in the incorporation of, and understanding of climate change science in relation to the governance of these events. Often these events are considered in isolation, and not as part of the bigger climate system and in relation to future climate change. Because of this, there isn't a deep level of reassessment of informal and formal processes for building resilience communities. The fragmented nature of considering these events prevents holistic planning. Further, the trend to "securitization" (response to acts of vandalism or terror) moves the institutional governance system away from a community resilience model which would involve the community in planning for extreme events, preparing and performing scenario training for these events, and responding in a coordinated, holistic fashion involving public, ngos, and volunteers. This increases vulnerability of local communities.

Because of the strong local social capital, a flexible governance system responds to events of drought which is highly beneficial. However, after the initial response to flood, flexibility was not found to be beneficial. Discrepancy in the treatment of flood victims and their financial claims, lead to discord. Allowing rebuilding in flood plains, and potentially providing multiple payments in future years to the same flood victims, leads to maladaptation.

Significant federal resources have been withdrawn from the institutional governance structure in relation to emergency and flood response. It is unclear that provincial initiatives in relation to flood plain zoning and community planning have filled the gap left by this retreat.

Concerns surrounding equity existed both at the local community level, with different communities having different resources with which to respond, and also at the individual producer level. Different producers have access, depending on financial resources, to the government policies and programs assisting them in preparing for extreme events as well as responding.

For Further Information

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2. Introduction

The goal of the proposed VACEA project, as indicated in the proposal to the IRIACC Program, was “to improve the understanding of the vulnerability of rural agricultural and indigenous communities to shifts in climate variability and to the frequency and intensity of extreme climate events, and to engage governance institutions in Canada, Argentina, Brazil, Chile and Colombia in enhancing their adaptive capacity to reduce rural community vulnerability.” The methodological and conceptual framework of the VACEA project (see Figure 1) was based on a vulnerability assessment model. The model emphasized, as a first stage, the evaluation of present and past vulnerabilities of rural populations and agricultural producers (Theme 1) and an analysis of future climate conditions (Theme 2) and, in a second stage, an integrated risk analysis in which the present vulnerabilities are interpreted in the context of future climate conditions (Theme 3). The approach selected by the project assumed that by assessing past and current exposure-sensitivities and the community’s responses together with future climate conditions, it would provide insights on the community’s future exposure-sensitivities and their ability to cope with future changes. The model was the backbone of the project and it provided an integrative framework to all the activities of the project.

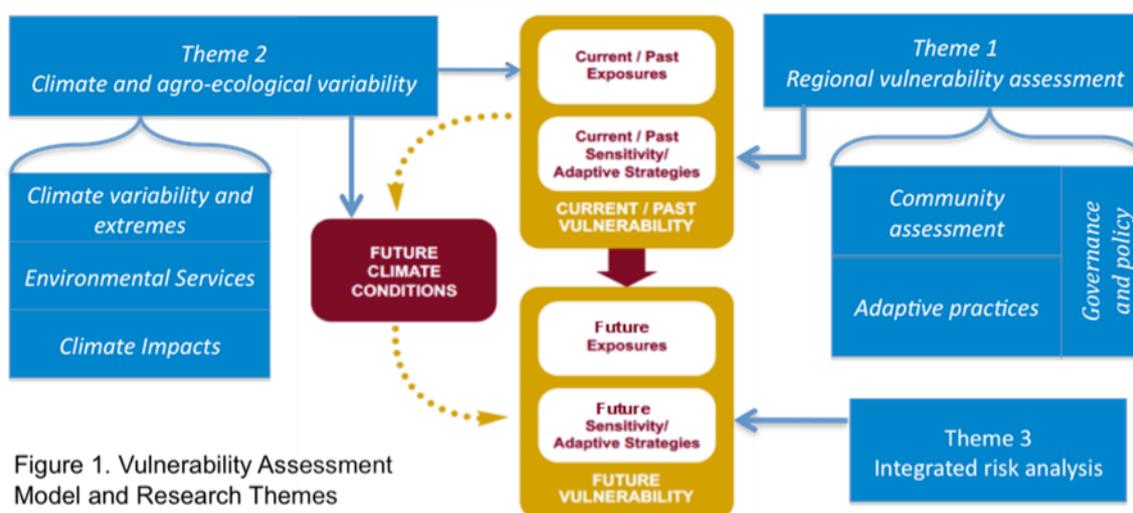


Figure 1. Vulnerability Assessment Model and Research Themes

The research activities of the VACEA project were structured around the concept of vulnerability. Specific components of the project were oriented to evaluate the vulnerability of rural livelihoods, such as the community vulnerability assessment, and the role that some other entities –governments and policy—played in the reduction of rural vulnerability. The next section discusses some of the dimensions of vulnerability in order to inform the methodological approach.

2.1 Vulnerability

Vulnerability has been conceptualized in different ways and from different perspectives, resulting on different procedures and estimations of vulnerabilities and risks (Birkmann,

2006, see also Patt et al., 2009)). In the case of the VACEA project vulnerability is defined as the degree to which a system, such as a rural community or agricultural producer, is susceptible to the adverse effects of stressors and change (Smit and Wandel, 2006; Wisner, *et al.*, 2004). Following the definition of the IPCC (2001: 995), the project emphasizes the roles of climate variability and climate change as stressors that create risks (and opportunities) for rural people.

In more precise terms, VACEA defines vulnerability as a function of two dimensions: first, exposure to climate hazards and their impacts; and, second, the social conditions that determine sensitivity - the degree to which a system is affected by climate-related stimuli - and adaptive capacity, the ability of a system to adjust to climate risks and opportunities by increasing its coping range. Figure 2 represents these two dimensions of vulnerability. Exposure is a characteristic of a climate system and it refers to climate hazards -i.e. droughts, storms, and others-- and their attributes -such as intensity, duration, and coverage— that define the magnitude of their impact on social systems. Sensitivity and adaptive capacity, on the other side, are characteristics of the social system and are defined by access and control of resources. In this perspective, vulnerability emerges from the interactions between the human and the natural systems.

In very simple terms, a social system that is characterized by limited resources is more vulnerable and, consequently, more conditioned to be impacted by climate hazards. Figure 2 lists these resources based on what the IPCC calls “the determinants of adaptive capacity” (IPCC, 2001: 893; for a similar list of resources see Department for International Development, 2000). Access and control of these resources are important to reduce vulnerabilities, but it is the capabilities of actors to organize them into adaptive activities what defines the balance between sensitivity (determined by lack of or limited resources), and adaptation (defined by the existence of resources that could be mobilized to reduce sensitivity).

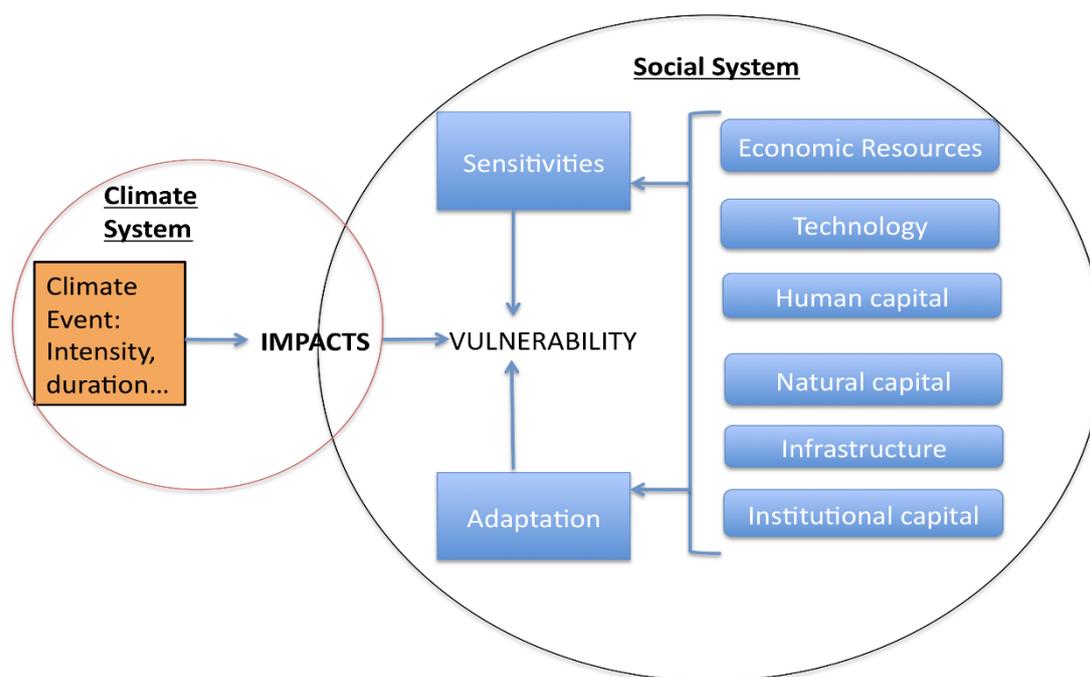


Figure 2. The dimensions of vulnerability

These determinants of adaptive capacity are:

- **Economic resources.** The existence of monetary capital, financial means, wealth, productive resources, and others forms, which could contribute to the development of an adaptive capacity.
- **Technology.** The availability and access to technology –such as irrigation systems, flood control measures, warning systems, and others-- as well the existence of a capacity to develop new technologies that could contribute to a more robust adaptive capacity.
- **Human capital.** The educational and knowledge levels, as well as expertise, we find in a system. Systems with the capacity to produce, disseminate and store information (high educational levels) have a better ability to understand and predict climate hazards, reducing their vulnerability to climate and climate-related events.
- **Natural capital.** The availability and access to basic environmental services (water, soil, seeds) that are fundamental to the viability of rural livelihoods.
- **Infrastructure.** The existing of proper housing conditions, drainage systems, weather-resistant roads, coastal defense, and others forms of allows regions and

populations not only to cope with extreme weather events but also to recuperate faster from their impacts.

- **Institutional capital.** Established institutions facilitate the management of climate-related risks –such as the existence and availability of insurance services, water conservation programs, and others—reinforcing the adaptive capacity of the population.

This last form of capital is found both at the local and the provincial and national levels. The VACEA project, following findings from previous projects that indicate that the adaptation of communities is always nested in larger institutional contexts, included a governance assessment as part of her research activities (see next section on the concept of governance).

It is no less important to gather information about the role that local institutional capital plays in the reduction of the vulnerability of communities. We have evidence that local institutions –especially social capital—contribute to the existence of an adaptive capacity, especially in cases of disasters, so it would be important to consider this aspect of communities into the community vulnerability assessment. (Local institutions identified in the community assessments will be further explored in the governance assessment.) It is also relevant to indicate that this list of resources is not exhaustive. Other forms of resources should also be considered in the community vulnerability assessment. Finally, we payed attention to what kind of capabilities (learning from experience, capacity for innovation, flexibility) are important in organizing these assets into adaptation actions.

There are also several other aspects of the concept of vulnerability that were taken into consideration:

1. **Communities' climate vulnerabilities are related to climate variability and extremes.** Previous studies have indicated that normal variability is not a significant issue for the members of rural communities. They are sensitive to extreme climate events, such as droughts and floods, and the associated impacts of these events, such as mudslides.
2. **Vulnerability to extreme climate events is strongly interlocked to other types of vulnerability.** Climate is not the single determinant of the communities' vulnerability. Rather, climate and water stresses are part of a suite of stresses that individuals and communities must manage on their everyday life. Rural people are exposed to several non-climatic stressors --such as market conditions, political processes, and others-- which are normally more relevant to them than climate. Particularly problematic for them is the interlocking of climatic and non-climatic vulnerabilities at a single moment in time, such as the case of a drought at a moment in which market crop prices are low. It is this interlocking of stressors that multiply the negative impacts of risks leading to double exposures (Leichenko and O'Brien, 2008).
3. **Vulnerabilities are unequally distributed.** A process of differentiation characterizes the integration of rural people to economic and social processes, where

some actors are able to attain a better integration than others. This is due both to a process of economic marginalization and to institutional failures, which result on an unequal distribution of resources vital to adaptive capacity. In other words, some rural actors have a better adaptive capacity than others due to a better economic situation.

4. **Vulnerabilities are not only related to economic circumstances but also to other conditions.** The nature of productive systems creates specific conditions of vulnerability for different type of agricultural producers. As an example, the water demands vary between farmers and ranchers, as well as among different type of producers. No less relevant is the localization of the productive units within the basin. Non-existent or limited access to irrigation is a fundamental issue for agricultural producers in the context of increasing water scarcities. In the same way, having a farm in the lower areas of the basin may limit the access to water.
5. **Vulnerability is fluid.** Vulnerability is not an unalterable condition but rather it is subjected to changes depending on the intensity of the stressor and/or, the quality and quantity of resources that are available to rural people. In other words, it is a process. If it is the existence or non-existence of resources what defines sensitivity or adaptive capacity then it is important to know the quantity and quality of the resources and the capacity of the rural person to use them properly. As an example, resources could be limited and if they are used unwisely in a situation of vulnerability it could leave a family with the necessary resources to face future risks.
6. **Vulnerability and resiliency.** Pelling (2011) advances the argument that adaptive capacity oriented to resiliency (to maintain the continuation of desired actions or events into the future) could be problematic because it involves the sustainability of the “unsustainable”. He indicates that there is another possibility: adaptation as transformation. This is an important distinction that should be kept in mind in the process of collecting data and data analysis.
7. **Vulnerability and scales.** Vulnerability operates at several scales: national, regional, community, and the farm or productive unit. It is important to clarify the level(s) of our choice.
8. **The predisposition to adapt.** The existence of “determinants of capacity” is relevant to the existence of an adaptive capacity (the reduction of vulnerability) but are they the condition that define the development of adaptation? Access and control of resources does not always mean a predisposition to adapt. It may be important to search during our fieldwork for mechanisms that may foster this predisposition. The capacity of innovation and institutional learning should be aspects to consider in the fieldwork.

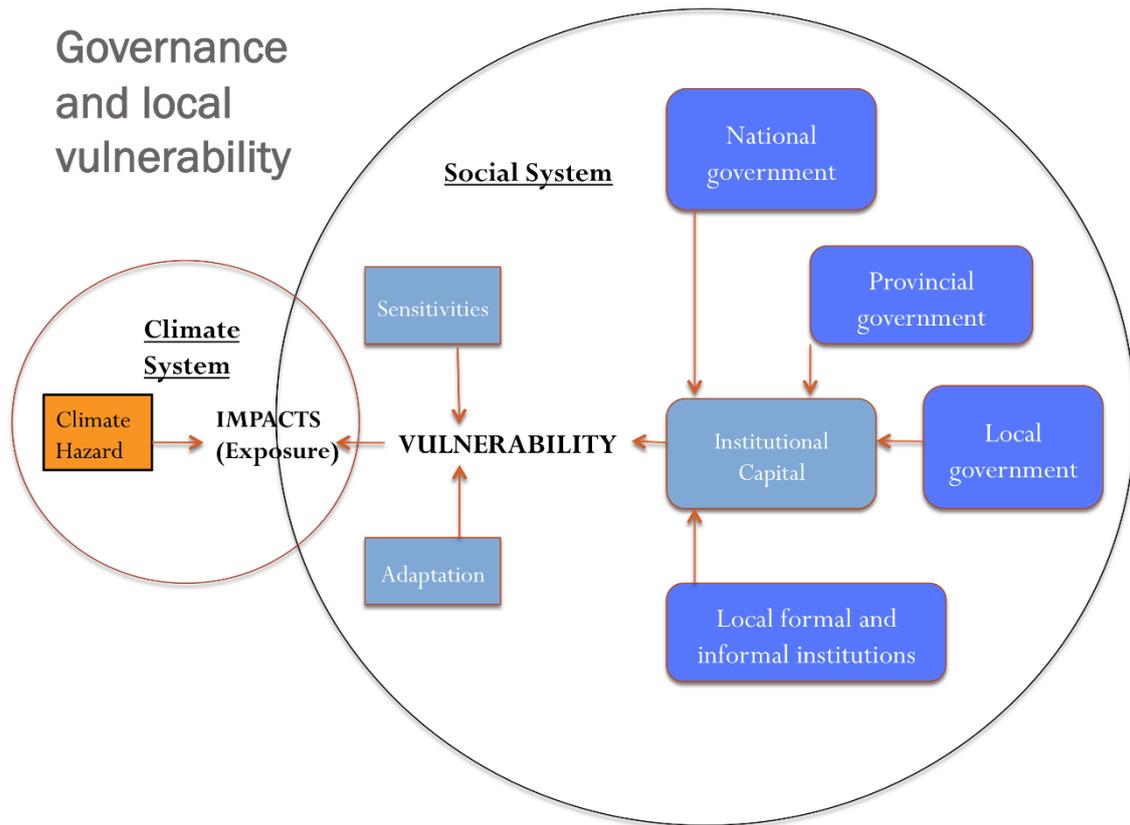
2.2 Governance

Governance is a term to be contrasted from the similar, but differentiated, terms of “government” and “management.” “Management” refers to the processes of decision making, coordination and resource deployment that occur within a given institutional setting assuming no change in rules and norms (Hatfield-Dodds et al., 2007, 3) while “government” centers on the institutions and actions of the state. The term governance is wider than both of these terms encompassing non-state actors such as businesses and civil society which are brought into the analysis of societal steering. Governance describes “the patterns that emerge from the governing activities of social, political and administrative actors” (Kooiman, 1993, 14). Governance is the institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their legal obligations and mediate their differences (Armitage et al., 2009). A good community vulnerability assessment will explore the institutions that rural community members, or actors, negotiate in relation to their vulnerability to climate stresses, hazards and extreme events. These institutions include inter relationships with the entities identified in the institutional profile of the community assessment. This information is foundational to the governance assessment.

Governance encompasses laws, regulations, and institutions, as well as governmental policies and actions, domestic activities and networks of influence, including international market forces, the private sector and civil society (Demetropoulou, 2010, 341). In relation to water, governance refers to the range of political, social, economic, and administrative systems that develop, manage, and distribute water resources (GWP, 2002, 14). In relation to extreme events, governance refers to the range of political, social, economic, and administrative systems that respond to, manage, and anticipate extreme events. A good community vulnerability assessment will explore the institutions that rural community members or actors negotiate in relation to the adaptation to water stress, hazards and extreme events. The community members being interviewed and their interconnection with those entities identified in the institutional profile of the community vulnerability assessment constitute the base of the governance assessment. Of particular importance is the identification of the key organizations interconnecting with the community member and specifically the community member’s relationship with local government.

The interrelationships of institutional capital, one of the key determinants of vulnerability and adaptive capacity, and the institutions of governance of the community is outlined in figure 3.

Figure 3: Governance and local vulnerability: the dynamics of institutional capital



The community will mediate stressors and assets through local institutions (social patterns) which are based on cultural practices, deep rooted lifestyles and ideological premises. This mediation may give rise to institutional capital or adaptive mechanisms which relate in part to:

1. the assets which a community has at its disposal; as well as
2. the interplay of government (federal, provincial and local government) and civic institutions and the bridges and barriers to adaptation provided by these entities.

Civic institutions are those social patterns resulting from the actions of civil society. Local government includes municipal government, urban government and local watershed advisory groups. Governance includes the process of decision making in relation to climatic events which is exercised by local institutions at the community level. An important focus of this research is on the local government which is mediating these community decisions through a combination of policy tools and policy processes as set by the federal and provincial governments.

Adaptive governance is that governance that spans a range of political, social, economic, and administrative systems and develops, manages, and distributes a resource in a manner that promotes resilience through collaborative, flexible, and learning-based issue management across different scales.

Adaptive governance recognizes that the present, past and future of human and biophysical systems are closely and intricately interconnected. Significant challenges are then posed for policy developers and decision makers including complexity, uncertainty and change, and problems of fragmentation (Dietz et al, 2003). Key characteristics of adaptive governance are institutions which are collaborative, flexible, and learning-based, and which manage issues across different scales of jurisdiction, timelines, and geography (Folke et al. 2005; Gunderson and Holling, 2002; Olsson et al. 2006).

Adaptive Governance has emerged from the literature surrounding resilience and complexity theory (Berkes and Folke, 1998). Resilience is the persistence or robustness of communities in the face of disturbance. Resilience is also understanding how communities can innovate in the face of complex, fast or slow changes, drawing on institutional memory and the ability to self-organize, recombine structures and processes, renew systems and find new ways (Folke, 2006, 253). Social-ecological resilience is the amount of disturbance a system can absorb and still remain within the same state or domain of attraction, the degree to which a system is capable of self-organizing, or the degree to which the system can build and increase the capacity for learning and adaptation. A vulnerable social-ecological system has lost resilience. This implies loss of adaptability (Berkes and Folke, 1998, 262). Governance needs to understand ecosystem dynamics and sources of social and ecological resilience and actively manage to deal with the interplay of gradual and abrupt change. From this need, “adaptive governance” emerges.

Adaptive Governance has been found to draw on a wide range of tools and methods but to share five distinctive shared assumptions:

1. It is recognized that social and biophysical systems are complex and adaptive and evolve in ways that are not easily predictable;
2. People are mostly rational social actors;
3. Knowledge (in relation to things such as resource availability, conditions across time and location, behaviour of other actors) is imperfect and unevenly distributed across actors;
4. People apply different evaluation criteria to choices in different institutional settings depending on communications or transparency;
5. Communities are able to develop sophisticated governance arrangements for common pool resources but these arrangements may be disrupted by changes in larger scale or higher level social systems;

Further, adaptive governance literature illustrates a number of distinctive insights:

1. In contrast to the common argument externally imposed management is the best or sustainable form of governance for common pool resources, self-governance is possible and desirable;
2. Contested governance (overlapping institutional mandates) can have benefits as well as costs;
3. Governance can be enhanced with diverse types of knowledge and perspective;

4. Local governance bodies can improve access to local understanding of resource functioning and contribute to adaptive governance improving higher scale risk management through local redundancy;
5. Improving the efficacy of institutional arrangements will generally require the development of collective action strategies or policy proposals drawing attention to dual roles of knowledge in determining the extent of government's license to govern and informing the detail of specific decisions through the creation of expert knowledge (Hattfield-Dodds et al., 2007, 6).

In this way adaptive governance operates at multiple levels and relies on different underlying sources of authority (Burris et al., 2005; Lebel et al. 2006). In relation to water, adaptive governance is sited as a new generation of governance institutions for resolving collective action problems that occur between different types of resource users and different agencies tasked with resolving these conflicts (Scholz and Stiffler, 2005).

Normative criteria used to judge whether a change in governance arrangements is good or adaptive is derived from the values not of the analyst, but the constituency. Further the evolution of rules and norms does not need to be conscious or deliberative or articulated in goal oriented terms to be adaptive (Hatfield-Dodds et al., 2007).

Based on this literature, the governance assessment shall be conducted according to the methodology below.

3. Methodology

The concept of vulnerability and its dimensions was the core of our conceptual framework and it should provide the conditions for a “unified methodology” and for an integration of the different research fields.

The proposal, in relation to attaining its objectives, proposed a regional vulnerability assessment (Theme 1). Three research activities of the first theme, the “community vulnerability assessment” (CVA) and the “local governance assessment” were carried out. Thereafter the “institutional governance assessment” was carried out. Governance interviews were conducted in this third research activity with federal and provincial governance stakeholders.

This report relates to the first and third research activity, reporting on secondary data collected respecting governance institutions, and interviews with carried out pursuant to the institutional governance assessment.

3.1 Collecting Secondary Data

The community vulnerability and governance assessment required the collection of baseline data from available macro, regional and local-scale data sources to generate both information about the distribution of climate vulnerability in the basin (regional vulnerability) and an institutional profile of the selected communities and/or livelihoods. This information was used to frame (a) the information obtained from the local actors and for contextualizing and understanding their experiences and perspectives. The institutional profile can be found in Fletcher et al., (2012) and included an inventory of most of the regional and local institutions, their networks, and their roles and responsibilities in relation to the local rural population. This institutional profile included government agencies, ministries, or departments, local governments, non-profit organizations, civil society organizations, and others. The information to develop this profile was based on existing documents and websites, as well as on local and regional contacts and partners of the project. In addition, within the institutional governance assessment, information was amassed relating to the federal and provincial governance institutions and appears in Appendix 8.4.

An inventory of pertinent laws, regulations, and policies of the organizations listed in the institutional profile was also compiled. These documents covered the area of water (water laws, irrigation laws, drinking water quality laws, for example) and response to extreme climate events (disaster planning laws and policies at all levels of government) as identified by the community. These documents helped guide and add depth to questions in relation to adaptation to extreme events and governance institutions. This information can be found in chapter 4.

3.2 The Community Vulnerability Assessment

The community-based vulnerability assessment was based on a “bottom-up” approach, where the “observation unit” is **the actor or stakeholder, be it a farmer or an organization such as a watershed stewardship group** was conducted. The rationale for this approach was to assess in which ways people are vulnerable to present and past extreme weather events in order to generate insights for the understanding of future vulnerabilities. This approach assesses vulnerability according to how actors perceive their exposures, sensitivities, and adaptive capacity in the context of other stressors and changes. These perspectives will be based on semi-structured.

The data gathered in interviews was organized around key topics and questions directed to address the various dimensions of vulnerability, specifically

- a. The conditions (exposures or stresses) and extreme events that the community/people have had to face.
- b. The specific stresses and extreme events that have an effect on the livelihood of the community and how people have been affected by these conditions,
- c. How people have managed (manage, cope, adapt) such conditions, both at the institutional and individual levels.
- d. What local or external aspects have constrained or facilitated their ability to deal with those conditions, and
- e. What people saw as their capacity to deal with possible changes in the future.

Thereafter the interviews were transcribed and coded using Nvivo 9. The findings of the community vulnerability assessment can be found in reports filed in this research project.

3.3 The Governance Assessment

It is important to note that the governance assessment was an exploration and assessment of the entire network of actors, institutions, relationships, organizations, and entities involved in managing the resource of water and responding to climate variability, hazards, and extreme events. The governance assessment was not an assessment of government or governmental institutions.

Based on the literature (Gupta et al., 2010; Huntjens et al., 2012), the following characteristics exemplify adaptive governance:

1. Responsiveness – the ability of governance networks, organizations and actors to respond appropriately and in a timely manner to climate variability, hazards and extreme events.

Does the governance regime respond to or account for ecosystem dynamics, climate variability, hazards, and extreme climate events? Do early warning systems exist?

2. Reflexivity – the social learning aptitude of water and extreme climate events governance institutions.

Does the governance regime formally or informally reassess practices for assisting adaptation to climate variability, hazards, and extreme climate events?

Are institutional patterns in place that promote mutual respect and trust between actors and an openness towards uncertainties?

Do these patterns learn from past experiences? Is there constant monitoring and evaluation processes?

3. Flexibility – the ability of the water and extreme climate events governance institutions to respond in a variety of manners as appropriate to the situation, context and particular needs of the community.

Can practices that assist adaptation be modified, extended and changed quickly in response to unanticipated events?

Do the practices adjust to take into account different needs and requirements?

4. Capacity – the informational, human, and social capital in existence necessary to respond appropriately to climate variability, hazards, and extreme events.

Are there leaders (government or significant social actors or networks in communities) that are capable of responding to climate variability, hazards, and extreme events?

Is there access to necessary and appropriate information?

Do the actors in the governance network have access to the science of climate variability and extreme events? What is the interrelationship between the community members and the scientists?

5. Equity – the fairness of the water and extreme climate events governance regime in process and impact.

Are there opportunities for multiple frames of reference, opinions, and problem definitions as well as the involvement of different actors, levels and sectors in the governance process?

When and how are non-government actors involved in decision making? Do these actors have the opportunity to influence, significantly change, or make major decisions?

Are responses to climate variability, hazards, and extreme events equitable to all community members? Are the governance institutions legitimate or supported by the people? Are accountability procedures in existence?

These themes were explored in the governance assessment through semi-structured interviews. As indicated in the proposal...the institutional governance assessment was based on the institutional profiles and data collected in the in-depth interviews of the CVA, An assessment of local governance did take place at the same time that the community assessments but the assessments of regional and national governance bodies was to be done *post facto* the community assessments. Because of the delay of the local governance assessment being transcribed, analyzed and reported on, the interviews of the regional and national governance bodies occurred at the same time as this was occurring and without the benefit of the results of the local governance assessment.

The primary data collection instrument for the institutional governance assessment was semi-structured interviews with institutional representatives of government agencies (*i.e.*, managers and policy makers), non-governmental organizations (NGOs), and community groups, such as irrigation associations and watershed advisory committees. To carry out these interviews we:

1. Discussed with partner organizations and identified the key organizations and actors involved in local governance institutional capital formation. We asked them to identify representatives of these agencies, people who we could contact and interview.
2. Once the key organizations were identified, we collected as much information as possible about the agency's functions, policies and programs, staff, distribution of local agencies, and other issues.
3. The identified representatives were then approached for setting up the interviews. Prior to the interview, the interviewer reviewed the institutional profile and all documents obtained through the secondary data analysis so as not to waste time during the interview.
4. To allow comparability between governance assessments, the format of the interviews all followed the same guide. The draft interview guide is in the Appendix.
5. Interviews were recorded, unless the participant felt more comfortable not having the interview recorded. Then the interviewer took notes.
6. Interviews were then transcribed, and coded by theme.

3.4 Interviews

The following interviews were conducted in 2012:

Table 3.1 Local Community and Governance Interviews

Community (Study Area)	Community Vulnerability Assessment (CVA) Interviews	Governance Assessment Interviews
Rush Lake	17	6
Shaunavon	34	18
Pincher Creek	33	20
Taber	16	26
Blood Tribe	To be conducted	To be conducted
Total	100	70

These interviews were conducted by research assistants: Amber Fletcher, Bruno Hernani, and Jessica Vanstone with assistance from Erin Knutilla. All of these individuals were at the time PhD candidates at the University of Regina.

In respect of the Institutional Governance Assessment the following interviews were conducted in 2012-2014:

Table 3.2 Federal and Provincial Institutional Interviews

VACEA – Institutional Governance Assessment Interviews			
	Canada		
1		Ag Canada	C1
2		Public Safety	C2
3		AESB	C3
4		Environment Canada	C4
5		Engineers Canada	C5
6		NGO	C6
7		Pegasis	C7
8		IISDR	C8
9		Institute of Catastrophic Loss	C9
10		Climate change Adaptation Toronto and Region	C10
11		Farm Credit Canada	C11
	Total		11
	Saskatchewan		
12		Red Cross	S1
13		Water Security	S2
14		Water Security	S3
15		Inter-Governmental Ministry	S4
16		""	S4
17		Irrigator	S5
18		Municipality – Emergency Planning	S6
19		Emergency Planner - NGO	S7
	Total		7
	Alberta		
20		Emergency Planner - NGO	A1
21		Emergency Planner – Strategic Initiatives NGO	A2
22		Alta Ag - Executive Director	A3
23		Alta Ag	A4
24		Irrigation Association	A5
25		Alta Env and Sustainable Resource Dev	A6
26		""	A7
27		High River Flood Victim	A8
	Total		8
TOTAL INTERVIEWS			26

These interviews were conducted by Margot Hurlbert and Harry Diaz. It was notable that a great difficulty existed in talking to people from federal government departments. Many people contacted with the federal government declined interviews. One potential interviewee advised in writing that approval could not be obtained from his superiors to participate. Several of the interviewees expressed concern about confidentiality and

asked that their interviews not be transcribed and the information be handled with the utmost confidentiality.

4. Institutions

4.1 Intro

The impact of climate change (specifically the increasing occurrence of extreme events of drought and flood (IPCC, 2012; 2014) on human well-being and vulnerability is less understood than the transformations of the natural climate system (National Research Council, 2007). The institutional governance system, or the pattern of dealing with basic social functions (Lauer et al., 2006), is an important component of the adaptive capacity (IPCC, 2001, pp. 893-897) of agricultural producers (Hurlbert and Diaz, 2013). In relation to governance response to droughts and floods, the institutions relating to water, droughts, and floods were chosen as the focus on this research.

Governance encompasses laws, regulations, and organizations, as well as governmental policies and actions, domestic activities and networks of influence, including international market forces, the private sector and civil society (Demetopoulou et al., 2010: 341). It entails the interactions among structures, processes, rules, and traditions that determine how people in societies make decisions and share power, exercise responsibility and ensure accountability (Lebel et al., 2006, Raik and Decker 2007, Cundhill and Fabricius, 2010: 14). Thus, governance involves institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their legal obligations and mediate their differences (Armitage et al, 2009, Kiparsky, Milman and Vicuna, 2012). A rich literature has developed regarding adaptive governance, adaptive water governance, and specifically how the wider institutional context of governance can facilitate adaptation and improve adaptive capacity of communities. This adaptive capacity is especially important in responding to drought events. The governance framework surrounding drought (constituted by such things as water allocation laws, programs and policies allowing preparation for drought, and income stabilization in the event of drought) plays an important role.

There is much literature surrounding the adaptive governance of water, and the subsumed institution of water law. Water law establishes the formal framework of rules within which people and organizations operate in relation to water and constitutes a foundation of water governance. Water governance refers to the range of political, social, economic and administrative systems that develop, manage, and distribute water resources (GWP 2009: 14). It involves public and civil society organizations and comprises of norms, programs, regulations, and laws, relevant to the management of water resources (Hall 2005, See also Conference Board of Canada 2007, UNDP 2007, de Loe and Kreutzwiser, 2007).

The following table lists the federal institutions which have a mandate in relation to water, flood, and drought in the study areas:

4.2 Federal Institutions

The following chart lists the major federal institutions involved in drought and flood. Ag Canada is the primary institution responding to drought while Public Safety Canada

is the primary federal institution relating to disaster. Significant floods are generally classified as disasters.

Table 4.1 Institutions Responding to Drought and Flood

Level of Government/ Organization	Government	Civil Society and Non-Profit Organizations	Private Organizations
National	Natural Resources Canada Environment Canada Agriculture Canada Health Canada Fisheries and Oceans Public Safety Canada	Canadian Water Network Ducks Unlimited Canada Canadian Water and Wastewater Association Forum for Leadership on Water	
Inter-provincial	CCME – federal, provincial and territorial environment ministers Prairie Provinces Water Board SS River Basin Advisory Committee	Red Cross/Red Crescent Society Salvation Army	

There are two significant developments that have occurred at the international level in relation to the federal governments:

1. Canada has withdrawn from the Kyoto Protocol in 2011 (CBC, 2011) as well as the UNCCD in 2013 (Hamadjan, 2013). These are the two most important agreements relating to climate change and drought. Although Canada withdrew from the Kyoto Protocol (the Conservatives blamed the liberal government for having made an error committing to the protocol), it still participates in the UNFCCC COP. The Prime Minister, Stephen Harper, has set a target of reducing annual emissions to 17 percent below 2005 levels by 2020. This is a much lower threshold to meet than the Kyoto protocol target of cutting below 1990 emissions levels (CBC, 2011; De Souza, 2012).¹ Statistics of the UNFCCC report Canada has a 49% increase in GHG emissions from 1990—2011 (FCCC, 2013).
2. In respect of the UNCCD, the Canadian Development Agency oversaw Canada's participation and in one report stressed the importance of this convention for Canada due to the "existence of drylands in the Canadian prairies" (Government of Canada, 2002, p. 30) which are the case study areas. Canada was required by the convention to address the issue of desertification in any sustainable development plans and policies and report on progress.

Canada does participate in the Hyogo Framework. The Hyogo Framework for Action (overseen by the UNISDR) was adopted at the World Conference on Disaster Reduction attended by 168 member states, 78 observer organizations, and 161 NGOs (UNISDR, 2005, p. 96). The Hyogo Framework is an example of soft law, legally non-binding but

¹ In 2011 Canada reports it emitted 702 Mt CO₂ of GHGs excluding LULUCF estimates. Between 2005 and 2011 emissions decreased by 4.8% (Government of Canada, 2014).

States generally observe the commitments it contains (Vig and Axelrod, 1999). The Hyogo Framework is a ten-year plan to make the world safer from natural disasters. This plan contained five priorities including: ensuring disaster risk reduction was a priority for all levels of governments, developing early warning systems, building a culture of safety and resilience and strengthening disaster preparedness (UN/ISDR, 2004). The Hyogo Framework's strategic goals include the integration of disaster risk considerations into sustainable development policies, planning and programming at all levels with a special emphasis on disaster prevention, mitigations, preparedness and vulnerability reduction, developing capacity to build resilience to hazards, and incorporating risk reduction approaches into the design and implementation of emergency preparedness, response and recovery programmes in the reconstruction of affected communities (UN/ISDR, 2005, pp, 3-4). Measurable indicators of the Hyogo Framework include tracking three key activities: improving national institutional and legislative frameworks, allocating new resources, and promoting community participation (La Vaccara, 2012). The "Global Platform," established in 2007, allows States to post their plans, identify gaps, and track progress in order to accelerate national and local implementation (UNGA, 2007). This public disclosure tool provides incentives for States to participate, implement, and follow the planning mechanisms provided in the Hyogo Framework. Canada has an Emergency Management Framework last revised in 2011 and a National Disaster Mitigation Strategy.

4.3 Alberta Institutions

What are the main organizations that respond to extreme climate as well as issues pertaining to local property and communities, events of drought and flood in Alberta? Government, civil society and non-government organizations, and private organizations will be identified in turn. Issues of local property, communities, and the management of Alberta's water is vested provincially. In Alberta the Environment and Sustainable Resource Development ("Alberta Environment"), a government department is tasked with water management as well as overseeing development (including oil-sand development) and environmental laws and regulations. Alberta's key water document is its "Water for Life" Strategy, initially developed in 2003 which has been revisited and reassessed periodically over the last decade (Alberta Government, 2013b).

Programming on drinking water, flood hazard identification, groundwater, lake water quality, surface water quality, etc. are handled by Alberta Environment (Andrews, 2012). This department links with the Alberta Water Council and other entities involved in water. Land use management plans are provided for by legislation, overseen by Alberta Environment; A South Saskatchewan Regional Plan 2013-2024 (Alberta Government, 2013) applies in the study region, setting air and water quality targets. **Adaptation to climate change** is partly the responsible of Alberta Environment overseeing the Climate Change Adaptation Framework and Alberta Agriculture which hosts a suite of producer adaptation programs (in conjunction with the Canadian government) (Alberta Environment and Sustainable Resource Development, n.d.). These programs offer targeted instrument and policy tools for responding to drought and flood because of the shared jurisdiction of agriculture.

Response to **drought** is coordinated by the Alberta Drought Management Committee and since 2001 Alberta has had an Agriculture Drought Risk Management Plan setting

out government action plans for response to drought (Government of Alberta, 2010). This plan establishes linkages to other relevant policies and plans (such as climate change), outlines activities for drought preparedness, monitoring, reporting and response.

Planning for and responding to an extreme event such as a **flood** resides with the municipality or local government. At this time, mutual aid agreements with other local governments and service providers (fire and ambulance) may be called upon. When this government is overwhelmed (as in the case of the High River flood in 2013), the provincial Emergency Management Agency will get involved. This Agency sets up a Communication center for coordination with an NGO Council and agencies such as the Royal Canadian Mounted Police. Funding for disaster recovery is provided by Public Safety Canada and paid through the provincial Agency.

Table 4.2 Government, civil society, and non-profit organizations involved in adaptation and response to drought and flood

Level of Government/ Organization	Government	Civil Society and Non-Profit Organizations	Private organizations
National	Natural Resources Canada Environment Canada Agriculture Canada Health Canada Fisheries and Oceans Public Safety Canada	Canadian Water Network Ducks Unlimited Canada Canadian Water and Wastewater Association Forum for Leadership on Water	
Inter-provincial	CCME – federal, provincial and territorial environment ministers Prairie Provinces Water Board SS River Basin Advisory Committee	Red Cross/Red Crescent Society Salvation Army	
Local-Provincial	Alberta Environment Alberta Health Alberta Agriculture Alberta Irrigation Projects Association	PARC Federation of Alberta Naturalists	Agri-businesses Insurance Companies Disaster Assistance Companies
Local-Municipal	Pincher Creek, Lethbridge, and Taber	Castle River Watershed Co-op Southwest Alberta Sustainable Community Initiative Irrigation Districts Pincher Creek Watershed Co-op Battersea Drain Watershed group Pincher Creek Emergency Management Agency Pincher Creek Emergency Services	

4.4 Saskatchewan Institutions

What are the main organizations that respond to extreme climate events of drought and flood in Saskatchewan? Government, civil society and non-government organizations, and private organizations will be identified in turn. In Canada, the provinces have jurisdiction over local property, water, and communities (Hurlbert, 2009). The federal government retains jurisdiction over matters of national interest, interprovincial and international issues (ibid.).

Although the Saskatchewan Water Security Agency is the predominate government organization in relation to water governance, when an event of drought or flood occurs, the Ministry of Government Relations steps to the forefront and manages the event by relying on the advice of the intergovernmental Drought and Excess Moisture committee. This allows all government ministries to be coordinated through, first of all the work of the committee, and then the Ministry (Government of Saskatchewan, 2012). Municipalities and irrigation districts are currently tasked with maintaining infrastructure, preparing emergency response plans for floods, and providing a first response in the event of a flood.

Institutions that promote adaptation and build the capacity of producers include Ag Canada and the Ministry of Agricultural for Saskatchewan. These government departments develop and maintain programs which build resilience and assist agricultural producers in stabilizing farm income during periods of instability.

Table 4.3 Government, civil society, and non-profit organizations involved in adaptation and response to drought and flood

Level of Government/ Organization	Government	Civil Society and Non-Profit Organizations	Private Organizations
National	Natural Resources Canada Environment Canada Agriculture Canada Health Canada Fisheries and Oceans Public Safety Canada	Canadian Water Network Ducks Unlimited Canada Canadian Water and Wastewater Association Forum for Leadership on Water	
Inter-provincial	CCME – federal, provincial and territorial environment ministers Prairie Provinces Water Board SS River Basin Advisory Committee	Red Cross/Red Crescent Society Salvation Army	
Local-Provincial	Saskatchewan Water Security Agency Saskatchewan Health Saskatchewan Environment SaskWater Drought and Excess Moisture Committee	PARC Sk Urban/Rural Municipality Associations Sk Association of Rural Water Pipelines Sk River Basin Sk Network of Watershed Stewards Sk Association of Watersheds	Agri-Businesses Insurance Companies Disaster Assistance Companies

	Ministry of Government Relations (Disaster Response)	Sk Eco Network Sk Environmental Society Nature Sask Saskatchewan Emergency Planners Association (SEPA)	
Local-Municipal	Urban and Rural Municipalities (Shaunavon, Rush Lake)	Watershed Advisory Committees (Swift Current Creek) Wheatland Conservation Area Irrigation Districts Southwest Public Safety Region Inc. Southwest Search and Rescue	

4.5 Drought

Drought response and adaptation have been a constant reality for the people of the Canadian Prairie Provinces, at all levels of government, since the beginning of the settlement period. The region has one of the most widely variable ranges of natural climate (from extreme heat to extreme cold) and hydrological resources. Droughts and floods are frequent. Into the future, the frequency and intensity of droughts are anticipated to increase (Sauchyn and Kulshreshtha 2008). Programs which respond to this increased risk will be increasingly important. Policies can be categorized into two groups. There are policies and programs which assist rural agricultural producers to adapt to more intense water shortages of longer durations. These programs and policies assist in adaptation to these changes in climate. The second type of programs and policies, covered below, respond to a situation of drought, after it has been declared as such.

The federal government has entitled its strategy in relation to farm programs “Growing Forward.” The first strategy was refreshed in December, 2012 with “Growing Forward 2.” This second strategy continued a suite of business risk management programs aimed at helping farmers manage risks from income declines resulting from drought, flood, low prices and increased input costs. These programs include:

- a) **AgriInvest:** A program aimed at helping to cover small margin declines. This is a self-managed producer-government savings account whereby producers can set aside up to 1% of their allowable net commodity sales and the federal government will match (to a ceiling of \$15,000 per year). Money can be withdrawn at any time.
- b) **AgriStability:** A program aimed at assisting in cases of large margin declines which may have resulted from low prices and rising input costs. This program protects farmers from large declines in farm income. If producers’ margin (allowable revenue less allowable expenses) drops below their average margin from previous years (a historical reference margin) by more than 30%, governments will provide a share of the lost income.
- c) **AgriInsurance:** A protection program for production losses related to specific crops or commodities caused by drought, flood, hail, disease or other natural hazards. Delivered by provincial agriculture departments, this crop insurance program provides for cost sharing of premiums between the producer, the province and the federal government. Producers receive a payment when their production is below their guaranteed insured

level of protection. To address flooding, in 2012, unseeded acreage benefits were expanded. Livestock price insurance coverage is being explored.

d) **AgriRecovery:** A program aimed at assisting farm businesses return to operation following disaster situations. This program provides a framework for federal and provincial governments to work together and cost share (on a 60/40 basis) funding on a case-by-case basis responding to natural disasters (extreme weather, disease, pests, etc.). This program is to provide coverage when assistance is needed beyond the existing programs.

Three new programs were created in 2013:

e) **AgriInnovation:** Designed to accelerate the pace of innovation by supporting research and development activities and facilitating the adoption, demonstration, and commercialization of innovative products, technologies, processes, practices and services. Two lines exist. An industry-led research and development stream provides non-repayable support for projects which are either in the agri-science cluster (aimed at mobilizing and coordinating a critical mass of scientific expertise in industry, academia and government which is national in scope) or the agri-science project (a single research project that could be local, regional, or national). The second line provides loans to facilitate the demonstration, commercialization and adoption of innovative agri-based products, technologies, processes or services.

f) **AgriMarking:** This program invests in projects to enhance the agriculture sector's access to international markets or assist in developing assurance systems and standards to give Canadian products a competitive advantage internationally.

g) **AgriCompetitiveness:** This program provides directed investments to help the agricultural sector adapt to rapidly changing and emerging global and domestic opportunities and issues, respond to market trends, etc.

The 2012 refresh of these programs detailed just over \$10 billion which had been expended through federal and provincial contributions and payments since 2007 and announced that over the ensuing five years (2013–17), \$3 billion would be invested in the programs (Government of Canada 2012). Two of the business risk programs, AgriStability and AgriInvest, had benefits reduced in the 2012 refresh.

Agricultural programming is an area of the Canadian federal system where both levels of senior government play roles in program financing and delivery. Over the course of the 1990s, the provision of the government portion of funding for programs such as Crop Insurance and AgriStability tended to reflect a 60–40 split. The federal government contributed 60% and the provinces 40%, although for Crop Insurance a portion of the provincial share came in the form of in-kind contributions related to program delivery. The federal-provincial Crop Insurance programs require producers to pay premiums accounting for up to one-third of program costs. AgriStability, on the other hand, does not require a cash contribution from farmers.

Field research efforts undertaken prior to the 2012 refresh identified considerable dissatisfaction among prairie farmers with the AgriStability program (RCAD 2012; Warren and Diaz 2012). A common complaint was the onerous application process. Many farmers required the services of an accountant to complete the required forms and costs for this service run from \$1,000–\$3,000 per application. Another area of concern involved

the five-year averaging system which saw the likelihood of payments to producers reduced in conjunction with extended periods of commodity price weakness coupled with rising input costs. After paying to submit an application, a farmer had no assurance that a support payment would be forthcoming. Producers were also frustrated by the lack of agricultural knowledge on the part of program administrators located in large urban centres such as Winnipeg. Recently some provinces, including Saskatchewan and Alberta, have worked to improve the quality of program delivery for AgriStability by taking over program management. While more localized administration may reduce some of producers' frustrations, it is unlikely that the reductions in overall program support associated with the 2012 refresh will be welcomed.

The federal-provincial Crop Insurance system has received mixed reviews from producers in the drought-prone regions of the Prairies, although complaints have historically been more common in Saskatchewan than in Alberta (RCAD 2012; Warren and Diaz 2012). Frustration in Saskatchewan stemmed from the effects of severe drought in the late 1980s and 2001-2002 on the finances of the program. Following a succession of years when payouts overtook the value of farmer premiums and government contribution levels, the Saskatchewan program fell into deficit. In response, premiums were raised to levels that farmers found exorbitant and payout levels were reduced during the 1990s and early 2000s. The Saskatchewan Party government, elected in 2007, addressed farmer concerns by injecting the cash required to make premiums and payouts more attractive. Since 2007, farmer participation in Crop Insurance in Saskatchewan has increased significantly. The Saskatchewan Government website relating to Emergency Response and Recovery suggests crop insurance for drought and flood are only available to crop insurance customers (Saskatchewan, 2014).

In Alberta, the provincial government has apparently been more consistently amendable to providing the financial resources required to maintain attractive premium rates in the wake of major drought events. The programs in both drought-prone provinces (Alberta and Saskatchewan) have benefitted from the fact that with a few localized exceptions there has not been a severe region-wide drought on the Prairies since 2002 (Warren, 2013).

The federal government position is that crop insurance is co-funded between producers (40%) and government (60%) and that approximately 70-80% of crops are insured in the Prairies (MacGregor et al., 2013). Crop insurance is regarded as a key adaptation tool and the program expected to continue to perform well as designed even given future climate change scenarios (MacGregor, 2013).

Agriculture and Agri-Food Canada provides information relating to drought through the "Drought Watch" website (Agriculture and Agri-Food Canada, n.d.). Timely information on weather and climate relevant to the agriculture sector in Canada is posted including historic weather and climate conditions, how these impact the sector, short-term forecasting products, and information on mitigating and adapting to the impacts of weather and climate.

In 1935 the federal government established rural water programming to address drought following the devastating multi-year droughts in the 1920s and 1930s. From 1935 to 1940 the Rural Water Development Program existed to provide funding to help develop

secure on on-farm water supplies in the Prairie Provinces. Group and community projects were added after 1980. From 1980 to 2004 the program expended an estimated total of \$154 million dollars. The Prairie Farm Rehabilitation Administration (PFRA), an entity created by federal statute, managed the program from inception (Government of Canada, 2002). A National Water Supply Expansion Program commenced in (2002 until 2009) expending approximately \$102 million dollars across Canada with roughly \$68 million dollars on the Prairies (Wittrock and Koshida, 2005: 9). These programs were most often shared programs with the provinces.

The Saskatchewan Farm and Ranch Water Infrastructure Program (FRWIP) continued this type of programming from 2008 onwards. Alberta has a similar program. The FRWIP supports the development of secure water sources in Saskatchewan in order to expand the livestock industry, encourage rural economic activity and mitigate the effects of future drought. Projects such as community wells, large and small diameter wells, shallow or deep buried pipelines, and dugouts are eligible for funding. Project costs are shared between the proponent (i.e., producer or municipality) and the federal and provincial governments (Government of Saskatchewan, 2011). This program was designed specifically to deal with hydro-climate extremes (i.e. drought) by providing producers and rural communities with increased access to water resources through infrastructure developments.

The Canada-Saskatchewan, and the Canada-Alberta Farm Stewardship Program (FSP) assist producers in adapting to water shortages. These programs assist agricultural producers in responding to environmental risk and water supply threats, thereby potentially reducing producers' vulnerability to climate and environmental change by increasing their adaptive capacity. The FSP is designed specifically with the stated goal of helping producers address on-farm environmental risk (not directly responding to climate change). The program provides eligible producers with financial assistance to implement beneficial management practices (BMPs) to help maintain or improve the quality of soil, water, air or biodiversity resources. BMPs are practices intended to ensure the long-term health and sustainability of ecological resources used for agricultural production, positively impacting long-term economic and environmental viability of agricultural production, and minimizing negative impacts and risks to the environment. Federal and provincial funds are available to assist in implementing BMPs. Although, not specifically designed to improve adaptive capacity for climate variability, there are a number of co-benefits associated with BMPs (e.g., reduced soil erosion, improved pasture management) that augment producer capacity to deal with variations in climate.

Drought Response Policies

The Alberta Drought Risk Management Plan for Alberta – 2010 plans for and responds to drought and weather extremes through strategies aimed at three situations: 1) normal or near normal conditions; 2) exceptional/notable conditions; and 3) extreme conditions. Drought is defined as, “an extended period of below-normal precipitation resulting in decreased soil and subsoil moisture levels and diminished surface water supplies affecting crop growth, livestock water or irrigation water” (Alberta Agriculture and Rural Development, 2010). This management plan integrates policies allowing adaptation and response to drought, and establishes a drought advisory group, which provides advice and oversees the plan. The Ministry of Agriculture and Rural Development has yearly drought

risk management plans in place that goes beyond crisis management and focuses on preparedness, monitoring and response. Also, this Ministry provides weekly Agriculture Moisture Situation Updates during the growing season and monthly during the winter season as a part of general drought-related programming.

In Saskatchewan an inter-governmental drought monitoring committee, lead by the Saskatchewan Ministry Department of Agriculture, includes representatives of the Water Security Agency, Crop Insurance Corporation, and Ministry Department of Environment. This committee provides advice and meets weekly in respect of agricultural drought. Drafts of drought plans have been produced, however although never finalized. The last documented was the 2002 draft, "Drought Risk Management Plan for Saskatchewan," which was designed to help government agencies develop a coordinated response to prepare for, mitigate and respond to drought (Agriculture and Agri-Food Canada, 2002).

In Saskatchewan there are several different drought related policies and programs in place. Until 2010, the Drought Relief (Herd Retention) Regulations required the establishment of a Drought Relief (Herd Retention) program to provide assistance to livestock producers to relieve financial hardship from the 2002 drought in Saskatchewan. Another regulation is the Livestock Drought Loan Program Regulation that requires the establishment of a livestock drought loan program to ensure the maintenance of livestock in a drought-stricken area.

Cities and urban municipalities have adapted to water shortages for many years. The City of Regina developed contingency plans in 1988 including water conservation programs and expansion of water treatment and delivery capacity (Cecil et al., 2005). Many urban municipalities have found voluntary alternate watering guidelines very effective as in the case study of Shaunavon.

Watershed groups have commenced planning for drought and excessive moisture. The North Saskatchewan River Watershed (Rowan et al. 2011), and the Upper Souris River Watershed (East et al. 2012) each have developed plans. The plans were facilitated by the provincial Water Security Agency and Natural Resources Canada. In the North Saskatchewan Plan, representatives of the watershed mapped their watershed by identifying key characteristics (including where poor drainage, good drainage, wells existed, etc.), reviewed potential future climate scenarios, and then identified vulnerabilities and adaptations to these future scenarios. The adaptation planning exercise was then organized by actions for producers, municipalities, and for policy and programs. The Upper Souris plan identified components of the Upper Souris Watershed Plan which were key action items related to drought and excessive moisture preparedness and began implementation through three activities. An Ecological Change Workshop was held and through participatory mapping the understanding of past changes in adaptive capacity were documented. Cattle producers participated in a drought planning workshop and a survey established a baseline for assessment of watershed understanding in the community. So far these exercises of drought planning have only occurred in a handful of situations. No current strategy of conducting planning exercises, integrating planning amongst watersheds, and coordinating this planning with other groups that might be interested (civil society organizations, etc.) exists. Although an important beginning, much is left to be done.

The provincial drought response committees offer timely, responsive, problem solving in a drought the situation of a drought. The institutional context for various government ministries is established so decisions can be made quickly. However, in the Saskatchewan case, finalizing a drought plan for the entire province to allow for coordination of not only the government ministries, but also civil society organizations, non-governmental organizations, municipalities, producer associations, and business should be a priority.

Climate Change and Adaptation Policies

The Prairie Provinces have had specific policies surrounding climate change and adaptation for the past several years. Saskatchewan's previous New Democratic Party government issued an Energy and Climate Change Plan in 2007— which was a cross-governmental vision in response to climate change and the development of a province-wide climate change adaptation strategy which included working with research organizations and supporting critical local research on climate change and adaptation (Government of Saskatchewan, 2007). These goals have been reiterated in the 25 Year Saskatchewan Water Security Plan (2012). Several watershed groups have developed drought plans as outlined above. Currently, climate legislation relating to mitigation remains on the legislative agenda, but is yet to be proclaimed.

In Alberta, legislation has been in existence since the Climate Change and Emissions Management Act (2003), a precursor for Alberta's Climate Change Strategy (2008). In addition to establishing a carbon offset market and providing consumer rebates in relation to energy efficient products, two programs were also introduced, a greenhouse gas reporting program and a greenhouse gas reduction program. These relate to the establishment of a greenhouse gas limit. In 2003 Alberta also created a "Water for Life Strategy focusing on issues of quantity, quality, and conservation of water, —all important issues in preparation for and during drought. The strategy initiated three important activities: 1) planning for future management of water via the provincial climate Change Adaptation Strategy; 2) development of land-use frameworks; and 2) watershed planning through local watershed groups.

Canada embraces many measures in these areas as well, but has no legislated reduction targets for Greenhouse Gasses. The most recent communication filed by Canada in 2010 with the UNFCCC Secretariat states that Canada expects to be 802 Mt above its Kyoto Protocol target of 2,792 Mt during the 2008 to 2012 period (Government of Canada, 2010). In December of 2011 Canada withdrew from the Kyoto protocol. The Conservatives blamed the previous Liberal government for having made an error committing to the protocol. The Prime Minister, Stephen Harper, has set a target of reducing annual emissions to 17 percent% below 2005 levels by 2020. This is a much lower threshold to meet than the Kyoto Protocol target of cutting below 1990 emissions levels (CBC, 2011; De Souza, 2012). Publicly the Prime Minister had rejected carbon pricing or a carbon tax (supporting regulating each sector instead). However, in Privy Council documents obtained under access to information, Canada stated it supported the development of new market-based mechanisms expanding the scale and scope of carbon markets (De Souza, 2013). It would appear that currently the Canadian government's position on climate mitigation is somewhat confusing.

4.6 Flood

Saskatchewan's central piece of legislation on emergency and disaster preparedness is the Emergency Planning Act, 1989-90, c. E-8.1. Emergency planning under this Act is performed primarily by the Ministry of Government Relations which oversees the Provincial Disaster Assistance Program. Under this Act, the Lieutenant Governor selects a provincial planning committee to develop a emergency preparedness plan. The Lieutenant Governor also establishes emergency planning districts for the purpose of organizing inter-municipal emergency planning and programs, known as Provincial Emergency Resource Centres (section 6). Each district has a district committee composed of persons appointed by local authorities (council of a municipality). A municipality is defined in the Municipalities Act, SS 2005, C.M-36.1 as clause 2(1)(w) "a town, village, resort village, rural municipality, municipal district or restructured municipality."

Local authorities are to establish their own emergency measures organizations and are responsible for the direction and control of the local authority's response to emergency, unless the Minister of Corrections, Public Safety, and Policing obtains control over the disaster or emergency. For rural municipal areas the local authority is the Ministry of Agriculture.

The Lieutenant Governor in Council (Cabinet) or local authorities have the authority to declare and terminate a state of disaster or emergency, and they are responsible for relaying such a declaration or termination to each other. Under the Provincial Disaster Assistance Program Regulations, 2011, the Minister of Corrections, Public Safety, and Policing is responsible for accepting and reviewing claims for disaster assistance.

This act also establishes the Provincial Disaster Assistance Program Regulations, 2011, RRS, C. E-8.1 Reg 2. This regulation allows local authorities to apply within 30 days of a disaster to be an area eligible for assistance. 95% of costs can be claimed for repairs to residences, garages and buildings can be claimed, as well as claims for the real property of small businesses, farm buildings, machines, tools or supplies, clothing with a cap of \$240,000 for dwellings and \$500,000 for small businesses, although there is no limit on local government authority's claims. Claim forms can be found at:

<http://gr.gov.sk.ca/PDAP>

Details on procedures and items which can be claimed for restoration are outlined, as well as a provision made for a claim for a mitigation project if the Minister is satisfied that the proposed enhancements will reduce vulnerability to future disasters.

Saskatchewan also emphasizes business continuity. The development of a Business Continuity plan is a requirement outlined by the Saskatchewan Emergency Planning Act. Each Ministry has a Business Continuity Plan. For example, the Ministry of Agriculture's BCP is a function of this ministry's Emergency Measures Plan that is in place. The goal of such BCPs is to protect people, information, operations the organization.

The Saskatchewan Water Security Agency (WSA) supports emergency and disaster planning through the communication of flood forecasting and the identification of flood prone areas. In February of 2011, the WSA, in conjunction with the Ministry of Corrections, Public Safety and Policing, implemented the Emergency Flood Damage Reduction Program intended to implement emergency flood damage reduction or prevention

measures for spring 2011 for communities, rural municipalities and individual farm and country residences.

Alberta's central piece of legislation surrounding emergency and disaster preparedness is the Emergency Management Act, R.S.A., C. E-6.8. This piece of legislation creates, as a part of public service, the Alberta Emergency Management Agency (AEMA). Lead by a managing director and under the supervision of the Minister of Municipal Affairs, this agency is responsible for the coordination and cooperation of all organizations involved in the prevention, preparedness and response to disasters and emergencies. Under the Emergency Management Act, the Lieutenant Governor may make regulations surrounding the assessment of disasters and emergencies. She or he may also assign responsibility to design, implement or monitor emergency preparedness plans. The Minister, through the AEMA, reviews and approves or may require the modification of provincial and municipal emergency plans and programs. The minister can also be involved in research-based assessments of resources and facilities, and information gathering surrounding actual or potential disasters.

The minister is responsible for dividing Alberta into subdivisions for the purposes of training, planning, and the development of emergency programs. Similarly, under the Act and under the supervision of the minister, local authorities are required to prepare their own integrated preparedness plans. In Alberta's Emergency Plan pursuant to the Emergency Management Act and the Government Emergency Management Regulation that defines the responsibilities of the Alberta Emergency Management Agency, there is a focus on local authorities as the primary responders to any disaster. It states:

Most response efforts are conducted at the municipal level. Prior to the response municipalities will have in place their Municipal Emergency Plan and regional/mutual aid agreements. The local authority will respond to a disaster or emergency using their integral first response resources, obtaining additional provincial resources and response through their mutual aid arrangements and as necessary, seeking assistance from the province. (3.4.1)

The Alberta Emergency Management Agency has several programs in place that support emergency preparedness. Lead through the Cross-Government Coordination Team, a business continuity program is in place that provides the necessary resources for departments to develop their own business continuity plans. The AEMA also supports first responders with a Community and First Responders Services program that provides assistance in risk management and planning, finding access to grants and disaster relief for communities and developing mutual aid agreements. There are also several Disaster Recovery Programs in place. The Government of Alberta supports the best practices of the AEMA through the Alberta Environment Codes of Practice that detail the need for consequence management plans, basically providing a framework for the development of emergency preparedness plans.

The Ministry of Environment and Water has a flood hazard identification program in place that produces studies and mapping on past and potential flooding.

4.6.1 Emergency Plans in Swift Current Basin, Saskatchewan, Study Area

The following tables illustrates the local communities and whether they have emergency plans in their community:

Table 4.4 Plans to Respond to Extreme Events in Shaunavon study area

Com- munity	Shaunavon	Grassy Creek and Wise Creek	Bone Creek	Arlington
Emer- gency Plan	EMO Coordinator (SV Gov 16)	<p>Interview re- sponse: No Plan (SV Gov 13, p. 22)</p> <p>However, minutes from RM Council meeting of February 12, 2014 record a plan. They are talking about a joint emer- gency re- sponse plan. Page 6, last paragraph. There was a lack of aware- ness about plans when in- terviews oc- curred in 2013. http://myrm.ca/108/files/2013/11/02-Feb-minutes1.pdf</p> <p>JOINT EMERGENC Y RESPONSE PLAN: 62-14 Kiss: That the Ad- ministrator</p>	<p>Interview re- sponse: Don't know if emergency plan (SV Gov 1, p. 22)</p> <p>Bylaws approved entering into mu- tual aid agreement with Shaunavon and appointing a joint EMO coordi- nator: http://myrm.ca/108/files/2013/11/BYLA-1-83-BYLA-TO-PROVIDE-FOR-ENTERING-INTO-AN-AGREEMENT-REGARDING-THE-FORMING-OF-A-MUTUAL-AID-AREA-EMERGENCY-MEASURES-ORGANIZATION-.pdf</p> <p>911 http://myrm.ca/108/files/2013/11/BYLA-1-93-ESTABLISHING-A-REGIONAL-</p>	<p>Interview re- sponse: No Plan (SV Gov 3, p.7)</p> <p>No plan but it is part of the Shaunavon and District EMO as stated in the</p>

		<p>email the Rural Municipality of Bone Creek’s Emergency Response Plan to the RM’s of Wise Creek, Grassy Creek and Arlington and ask for their comments on the possibility of working on and adopting a similar plan to have continuity throughout our municipalities for the emergency responders.</p> <p>CARRIED</p>	<p>911-EMERGENCY-COMMUNICATIONS-SYSTEM-.pdf</p> <p>No plan but it is part of the Shaunavon and District EMO as stated in the OCP. Page 12</p> <p>OCP:</p> <p>http://myrm.ca/108/files/2013/11/DOC317.pdf</p>	
<p>Fire Response</p>	<p>From the Shaunavon OCP (the OCP is in the link below):”The Town and the R.M.'s of Arlington No. 79, Bone Creek No. 108 and Grassy Creek No. 78 work together to maintain a highly regarded volunteer fire and rescue department that provides 24 hour emergency service.”</p>	<p>Shares with Shaunavon a fire response plan (SV Gov 13)</p>		<p>Have fire response plan (SV Gov 4, p. 4)</p>

Climate Change incorporated in plans	SV Gov 115 stated in the interview that the town will be completing the OCP (SV GOV 15, p.8)			No (SV Gov 4, p. 12)
Official Community Plan	<p>The OCP mentions (p.34) in a small paragraph, “Extreme rainfalls can cause floods and torrents that may prove devastating to communities. Climate change may cause rain events to occur more frequently as well as the events to be more severe. Council will consider the effects of climate change when making decisions regarding storm water management.”</p> <p>Then under 14.2 Objectives:</p> <p>“14.2.4 To ensure new development does not affect environmentally sensitive areas and is not susceptible to flooding.”</p> <p>OCP: http://shaunavon.com/userfile/file/Shاوناون%20OCP%2022-11-2012.pdf</p>		<p>OCP. http://myrm.ca/108/files/2013/11/D0C317.pdf Page 12 In 3.2.2. Policies “(iii) Council will prohibit the development of new buildings and additions to buildings in the flood way of the 1:500 year flood elevation of any watercourse or water body. iv. Council will require flood-proofing of new buildings and additions to buildings to an elevation of 0.5 metres above the 1:500 uyear flood elevation of any watercourse or water in the flood fringe. There is a policy in the OCP page 20 regarding flood lands.”</p>	<p>OCP. Page 12. http://myrm.ca/079/files/2012/10/Bylaw-No.-365-2014-Official-Community-Plan-.pdf This community plan does provide: 3.2.2.a. “(iii) Council will prohibit the development of new buildings and additions to buildings in the flood way of the 1:500 year flood elevation of any watercourse or water body. (iv) Council will require flood-proofing of new buildings and additions to buildings to an elevation of 0.5 meters above</p>

	<p>The OCP guidelines suggested by the government:</p> <p>http://www.municipal.gov.sk.ca/Programs-Services/Community-Planning/Official-Community-Plan</p>			<p>the 1:500 year flood elevation of any watercourse or water in the flood fringe.”</p>
<p>Shaunavon EMO plan covers Bone Creek and Arlington and fire response of Grassy Creek and Wise Creek</p>				
<p>Southwest Public Safety Region, a non-profit and member based organization</p> <p>FB page (https://www.facebook.com/SWPSR/info) The page says they have representatives of the 6 divisions in the SK (http://sarm.ca/about-sarm/members) including also Nekaneet First Nation</p>				

In Shaunavon, local emergency and governance institutions stated that because of the frequency of events of drought and flood, people think that preparation and training were a waste of time.

The following table illustrates the plans in respect of Rush Lake:

Table 4.5 Plans to Respond to Extreme Events in Rush Lake study area

Community	<p>Rush Lake is a Village and where the RM office is. The study area is the RM of Excelsior</p>
Emergency Plan	<p>The Village doesn't have a plan but the RM of Excelsior has one. (RL-Gov-04. Page 6)</p>
Fire Response	<p>Request made to fire departments of other communities (RL-GOV-04, Page 6)</p> <p>It is the Swift Current Fire Department report. Page 26 mentions Swift Current covers the RM of Excelsior</p> <p>http://www.swiftcurrent.ca/pdfs/emergency/fire/2011annualreport.pdf</p>
Climate change incorporated in plans	<p>No.</p>
Regional Plan	<p>Southwest Public Safety Region, a non-profit and member based organization</p> <p>FB page (https://www.facebook.com/SWPSR/info) The page says they have representatives of the 6 divisions in the SK</p>

	http://sarm.ca/about-sarm/members) including also Nekaneet First Nation
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The official community plans appear on the above table in relation to planning for flood and response to climate change as interviewees in local government and government in Saskatchewan referred to the measures contained in these surrounding flood zones listed above.

4.6.2 Emergency Plans in Alberta Study Area

Table 4.6 Plans to Respond to Extreme Events in Alberta study area

Community	MD of Taber	The County of Lethbridge	Pincher Creek
Constituents	Includes the town of Vauxhall, village of Barnwell and three hamlets.	Includes towns of Coaldale, Coalhurst, Picture Butte, villages of Baron and Nobleford and seven hamlets.	Town of Pincher Creek, the MD of Pincher Creek, Village of Cowley, and several hamlets.
Emergency Plan	Provided by fire department of Town of Taber. The Emergency operations coordinator is located at the fire department. (Municipal Emergency Management Bylaw4-2011)	A plan pursuant to the Emergency Management Act and County has an Emergency Service Department to coordinate for the area http://www.leth-county.ca/municipal/leth-bridge/lethbridge-website.nsf/All-Doc/AF44D4D9216A2FD4872570130073958E?Open-Document	Pincher Creek Community Emergency Management Agency (PCEMA) has emergency operations coordinator
Fire Response	Fire Department Town of Taber	A Joint Chiefs Committee exists for the Fire response in the County http://www.leth-county.ca/municipal/leth-bridge/lethbridge-website.nsf/All-Doc/15391E9AC7E9C6DD872577F5007B4A63?Open-Document	
Climate Change incorporated in plans	No. Better wildfire forecasting was desired (TB-GOV-04)	No.	One interviewee of the MD of Pincher Creek stated their role as, “It’s more of a reactive thing to climate change” (PC-GOV-14, p. 2).

			A technical water manager stated, “I don’t bother with climate scenarios. I’m on a two-year cycle” (PC-Gov-17, p. 7).
Inte- grated Land Use Plan- ning			The Town of Pincher Creek and Municipal District of Pincher Creek No. 9 agreed in their Intermunicipal Development Plan of September 2010 that each would pursue bylaws to restrict building in flood zones (10.2) http://www.pinchercreek.ca.previewmysite.com/docs/files/bylaws_policies/Pincher%20Creek%20Town%20%26%20MD%20IMDP%20Bylaws%20%202010-11%20%26%201200-10%20September%202010%20.pdf
Re- gional Plans	Working on inter-municipal emergency plan with Vauxhall, Barnwell and three hamlets. Want to have one municipal emergency plan to be more efficient and respond faster to emergencies.	Regionalization is needed to avoid redundancy in emergency response (TB-GOV-04) Agreement on Area Resources Sharing which includes 35 municipalities covering most of the area south of Lethbridge. Relates to emergency, not regular routine response, only. Provides for financial contribution. There is discussion about regional plans for emergency services in Nobleford, Picture Butte, Barons, Coaldale and Coalhurst.	

Although the plans appear to be in order one respondent stated the plan was too big, too detailed and nobody reads it (Hernani, 2013a, p. 19 Taber report).

In 2008, the Alberta government launched the Alberta Land Use Framework (ALUF), a land use planning system. The ALUF divides the province into seven land use planning regions. Each region has a local advisory council (Government of Alberta, 2008). While the implications of land use and development on the province’s water resources fall under the purview of ALUF, there are no formal linkages between the regional advisory committees established under the ALUF and those that operate in association with the WPACs established under the Water for Life Strategy. However, the memberships of the two advisory systems sometimes overlap. Both

systems encourage the participation of municipal governments, industry and agriculture. It is perhaps reasonable to ask how effectively integrated water management can be in Alberta given that the landuse and water governance systems operate within two distinct organizational frameworks. While there may be overlap in the organizations and individuals participating in watershed and landuse advisory committees, it is unclear as to how the two systems integrate each other's activities into their planning.

Alberta is just starting to encourage municipalities to plan in relation to flooding. Municipal land use policies. Municipal Land Use Policies (Alberta Municipal Affairs, 1996) only stated that municipalities are encouraged to identify areas prone to flooding and are encouraged to use mitigation measures. The Alberta Land Use Framework (Government of Alberta, 2008) provides on page 46 that the government of Alberta will develop policy to minimize exposure of developments and settlements to flood risk. However the Municipal Plan of 2013 of Pincher Creek only states that it will conform to the South Saskatchewan Regional Plan and comply with Provincial Land Use Policies. There is no specific provision respecting flooding or mitigation. No community plan was located or referred to for Taber.

After the High River flood focus appears to be once again on this topic as the January 2014 Albert Land Institute states, "After last year's flood, flood mitigation looks like a priority" (n.p.). Public consultation is to occur and a document was released titled, "Respecting our Rivers, Alberta's Approach to Flood Mitigation". In this document there will be consultation with watershed advisory committees, irrigation districts and 8.5 million is allocated to flood hazard mapping and developing a system to model future floods. A third step is mentioned of introducing a system to relocate homes in flood plans and introducing legislation to prohibit development in flood zones.

4.7 Inferences

It is clear from this review of institutions, laws, and programs responding to drought and flood that Alberta, Saskatchewan, and the federal government have a significant institutional presence in responding to the events of flood and drought. The Prairies have had numerous floods and droughts over the decades. There are numerous policies and instruments which assist individual producers respond to drought and recover in the event of flood.

However, the retreat of the federal government is being felt in the study areas of Saskatchewan and Alberta. The withdrawal of the federal government support relating to irrigation infrastructure and community pastures is particularly acute in Saskatchewan. There is cause for concern relating to liability for flood events. At the moment municipalities appear in the headlights as responsible legally and effectively for planning for and responding to emergencies and events such as floods. However, over the last few decades the federal government has withdrawn support that previously existed in this area. Municipalities, especially in Saskatchewan, that suffer from lack of resources, are struggling to fulfil their legislated mandates. Positive development is occurring with regional planning as illustrated by the EMO office in Shaunavon, and the Southwest Public Safety Region Inc.

The next section, the integrative discussion, provides information obtained from the interviews with key people involved in the federal and provincial governance level surrounding events of floods and drought.

5. Integrative Discussion

5.1 Intro

Semi-structured interviews were conducted with twenty seven people with deep experience in relation to responding to disasters of drought and flood at the provincial and federal level. No one event was the focus of the interviews, although many interviewees did recount a particular event in order to illustrate their response to questions in the interview. The guide that appears in Appendix 8.2 was followed, however, a thorough review of secondary sources had been made in order to concentrate fully on the expertise of the interviewee in relation to how governance institutions responded to droughts and flood in relation to the reduction of community vulnerability and the themes of adaptive governance. Because of this, a detailed review of a single event cannot be made. Perceptions surrounding key areas of institutional capacity emerge.

These key areas that emerged from the interviews related to educational and institutional support for communities, how actual events are responded to, the state of insurance for flood and disaster, learning processes from past events, perceptions about risk and climate change, and who are the institutions involved in public safety. Each of these are reported on in turn.

5.2 Educational and Institutional Support

The local community and individual producers are the first responders for extreme climate events of drought and flood. Because events of drought are creeping, or of slow onset and with geographically diverse characteristics, these events are not generally labelled as “disasters” in the emergency planning realm, and are handed at the provincial and federal level by Departments or Ministries of Agriculture. In fact, droughts are no longer included in the disaster databases because, “The way that we define disasters at Public Safety Canada for eligibility under our programs is that they have to be time delimited and with droughts because there is no clear start and date necessarily they tend to be handled through other areas. So for the most part it all goes through Agriculture and Agricultural Food Canada and they are the ones who maintain the kind of equivalent programs (C2, p. 11).

In relation to floods, the community and individuals are the first responders. If the flood is of such a large scale that more than one community is involved, the provincial government may become involved in the initial response, as was the case of the High River Flood of 2011. The Canadian government only becomes involved when asked, and this is through the auspices of the Canadian army. Unlike FEMA in the United States, Public Safety Canada, does not have resources to allocate to disaster recovery. Public Safety Canada runs the disaster assistance program which is delivered in partnership with the provincial government. Public Safety Canada also provides an information diffusion through the Hyogo platform. The provincial and federal governments do have their own emergency plans and operations centers. There is also a “National Disaster Mitigation Strategy” and a national “Emergency Management Framework”. There is also a Canadian “MASAS” system or “Multi-Agency Situational Awareness System” that provides

real time updates from any stakeholder with access which includes municipal emergency managers and provincial emergency managers that operates real time across Canada.

There is a significant mass of institutions at the provincial and federal level which provide support and information in relation to response to disasters or flooding. The types of institutional support is documented in the following excerpts from interviews. Local watershed groups were thought to be essential for bringing together local community stakeholders and providing a forum for discussion and participation. Laws and regulations were thought to have a role over the long term for changing behaviour and planning in relation to flood. Laws can prevent rebuilding in flood zones or design of products and buildings so excess water is not a “flood” or does not cause damage.

- 1. Responding to emergency events occurs in a bottom up manner in Canada. The first response occurs at the municipal or local level. If the emergency is of such a degree (in size or severity) that the local municipality is overwhelmed, or in need of more resources, then the provincial governments (of Alberta and Saskatchewan) will become involved. Interviewees described this process:**

The framework for emergency response in Canada is the individual. It starts with you and me knowing what to do when the flood waters are creeping towards the house or the power is out for two weeks on end, it is up to us to be prepared. If we for some reason can't cope or it is a wide spread event then the municipality is the first level of government, the first order of government, to respond and manage and in all the provinces across Canada that is how it works. The municipalities are in charge. First of all if they need support of any kind they go to the province for that. If they are overwhelmed they will declare a state of local emergency and that gives them the extra new powers but by that stage the provincial government is probably already involved providing help and may have encouraged them to declare a state of local emergency to give them the legal protection they then. The province then would support. The municipality may have called upon their mutual aid partners and that is a standard planning strategy in Canada where you know you never have enough resources whether it is fire trucks, ambulances, public works vehicles, or hospital beds or whatever, you have an agreement with your neighbours to support each other. So that would probably already be in place and then the province supports with whatever is needed and if the province is overwhelmed they would call on the federal government (10. A1; p. 5).

- 2. The local community is responsible for planning and often this planning resides with city policy and fire personnel. For example:**

All police departments in 1980 went to the police chief's convention and it was all about emergency preparedness. Our chief came back to Regina and said we need an emergency plan... At least there was something there and then went into the police plan and developed a complete response to the police department with a lot of help from a lot of other people... (04. S7; p. 5).

3. The most important determinant of effective emergency planning, is direction from the top, but important roles are played by the provincial network of outreach coordinators, and at the local community, fire and emergency responders all work together:

There is no more frustrating a job than being an emergency planner when you don't have support of Council and senior management because I have been there and that is why I left (04. S7; p.3). It has to come from the top. If it doesn't come from the top it is useless. (04. S7; p.9).

4. The provincial role in emergency response was described as:

Our role in helping communities have plans is we provide training and education and we have the expertise in that field and we support, mentor, provide training opportunities and have field staff that assist those communities that are going to be working on their local emergency plans to do so that is in the preparedness phase (08. S4; p. 1).

Well I was with the provincial government and was with the department responsible for emergency management in the province. So our role was basically oversight and support for the municipality and it happened and you should be able to get a handle or a record of the drought situations in Alberta if you contact the emergency management agency (10. A1; p. 4).

5. In Saskatchewan, although there is not drought plan, there is a committee responsible for coordinating drought emergencies.

Yes and it is federal and provincial and not everybody comes all the time and lots of times it is "What's new", "Nothing" so same as last week but during times like in 2011 when things were happening there was lots of open, frank discussion about what to do. So the discussion was taking place you know like early on like in January. Okay we know that something is going to happen this spring so let's get geared up so you had guys like crop insurance employees to make changes to their program to reflect what was actually needed. You know we are ready to change dates and they did that on a minutes' notice. They were ready to change how much they would pay out and they did that. There was none of this oh we have got to take it to the minister in Ottawa even though it is a federal program. You know crop insurance is a federal program but it is ministered provincially but delivered locally so you have got a local crop insurance office in North Battleford that is able to make decisions and that is the way things should work. (14. S3; p. 8).

6. The federal government role is described as that of providing information or coordinating services.

Well I don't think that was Environment Canada. I think **Natural Resources Canada** gets involved in that. Environment Canada, I mean they call it water survey, but really what the water survey of Canada does is it measures stream flow and discharge

like it calculates discharge from surface water. So it is much more of a hydrometric program so measuring the actual flows.

IV Okay and that would feed right into the Prairie Provinces Water Board.

R Yes it provides for both - the meteorological and the hydrometric programs provide support to all of these water boards and committees because a lot of the planning for water apportionment for instance and water management requires the information from the monitoring sites so meteorological sites for rainfall for instance and we used to do a lot more on evaporation and things and then for the water survey because they have a near real time data base on water levels. (01. C4. p.1).

We do a little bit but again it is mainly providing data. So for instance if the City of Calgary wanted to look at its vulnerability for future floods they would be getting a bunch of the baseline data from us like on the stream flows and they may even you know ask for one of our people to sit on a working group temporarily or something like that. So we tend to support the initiatives of others but we would never say Calgary you must do this (01. C4. p.7).

No the service that **Public Safety Canada** provides is really a secretariat service. So we enable the platform to happen but really it is not owned by Public Safety Canada, it is its own entity, so we provide sort of the forum for it to happen, provide some support through Secretariat Services for the different working groups and through the arrangement of the round table but other than the platform, individual working groups kind of are responsible primarily only to their own membership and to the interdisciplinary advisory committee of the platform of which Public Safety Canada has one seat but there are eight seats around the table all equally weighted. (09. C2; p. 4)

7. The federal government coordinates a “platform” or inter-agency group in accordance with the Hyogo Framework and support to the Prairie Provinces Water Board:

So the primary outreach vehicle that we use for that is Canada’s Platform for Disaster Risk Reduction which was established in 2010 under the auspices of the Hyogo Framework for Action which was kind of a non-binding agreement among 168 countries under the United Nations Strategy for Disaster Reduction and basically Canada’s platform has been recognized by the United Nations as one of the most open and inclusive platforms in the world. So we are kind of consistently referenced as a best practice and the way the platform works is that there is ongoing work, a bunch of different interdisciplinary working groups that happen throughout the year and that platform gets together once annually at an annual national round table for disaster reduction and so it brings everyone together in plenary and includes folks from all levels of government so federal, provincial, municipal, the academic sector, the private sector the S and T sort of government contract and researchers as well as other science and technology practitioners, insurance industry and it is a very open

membership model so anybody can apply, anyone from private institutions all the way up to IBM or big multi-national corporations. Anyone is free to participate on any of the working groups based on the working groups own terms of reference. So we see a lot of really interesting things start to play out with all of those different levels of players coming together. (09. C2; p. 4).

So I am actually on the committee on hydrology on the **Prairie Provinces Water Board** so I was aware of work through that and mainly because of the Old Man Basin stuff that was going on and so I have been kind of sitting in the odd time as an acting board member for the AFC. I am not now but I was for a while but I am also AFC's member and one of two federal members on the Prairie Provinces Water Board committee on hydrology and so Mike Renouf is the executive director for the trans boundary water unit and he chairs so he is basically the executive director for the Prairie Provinces Water Board and in that role he chairs all of the technical committees which is the committee on hydrology, committee on water quality, committee on ground water and AFC is one of the two federal members on the board. The other is Environment Canada and so we are plugged into all that. So I was aware that this was going on and I know there were some workshops held in Swift Current, Creek Watershed and Old Man Basin. (18. C1 part I & II; p. 1)

8. A federal committee exists for senior officials' responsible for emergency management.

There is a committee called the senior officials responsible for emergency management, SOREM, and they meet a couple of times a year with the federal government to basically discuss emergency management, policies to move things forward, and they brought it to the table just about every year it was on the agenda. You know we have got to start thinking mitigation, not just thinking about but putting some money in mitigation and it is a key part, a key phase of emergency management but still has a long way to go. (10. A1; p. 8).

9. The Red Cross and Salvation Army were seen as having a role in responding at the community level offering services such as counselling and mental health support:

Well I had the opportunity to volunteer for some major events in the United States through the American Red Cross so I am very well aware of how they respond. The Canadian Red Cross is far, far, from being. They would love to be that but they are far, far from being there and I used to work for the Canadian Red Cross a long, long time ago as well so I really understand what they are about and what they are trying to achieve. You are right they are much more well-known in the international communities and for some reason and I don't know why, it is has just not got hold in Canada. They have their one thing that they do which is registration party of family in case of disasters and they have always had that role and during the Manitoba

floods of 1997 you know they had a very big role in that but it was that piece. It wasn't sheltering people; it wasn't providing food like the American Red Cross in emergencies. So I don't know. I know over the years they have been trying to expand their role but in our province and the legislation that we have it really tasks the municipality to provide those support services to the effected population and so that is probably why the Red Cross hasn't actually taken over the roles of shelter, feeding and clothing and all of that and we do have other organizations that do that as well. So it is really a matter of coordinating what is everybody doing and coordinating their response.

IV And we have other institutions that do that?

R The Salvation Army will do feeding and clothing I believe. So the City of Regina have I think pretty good emergency social services plans where they have different groups doing different parts of that. So I mean they shelter people in the school gymnasium or do you have enough hotel rooms that you could put the first 50 families and it really depends on what the nature of the emergency is, what time of year it is and what your capacity is within your municipality. So for example I am not sure I didn't get a sense of how bad we might have a forest fire season this year, but when we have really bad forest fires we have to evacuate all those people out of those communities because they are surrounded in smoke and obviously that is a medical issue. So where do you take them to. I mean evacuation on a family is hard enough let alone moving them from here to there to there. You may not only have to move them once let alone all the support that they need and then they are moved to there and then you get them back home as soon as we can. (06. S6; p.5).

I sit on the Western Zone Recovery working group and there is really an increased emphasis on having that mental health support earlier on in the process when people are impacted. Whereas even in 2011 when we did some of that response work in the south east corner of Saskatchewan, I was the Recovery Manager at the time, and you know we sort of waited till we were further on in that recovery process before we starting calling in or working with the Regional Health Authority, the Sun Country Health District, on having counsellors come in. We always had the pamphlets available and the contact information but it really is now sort of proactively making sure that those people are there right from the get go. (03. S1; p.4).

10. Laws and regulations of the province can assist in adaptation:

Where there has been an opportunity through government regulations to try to reduce future risk that is affected by how some of those compensations pay that is outside of the compensation program there are many different rules about where properties are allowed to locate and building requirements about flood heights and construction practices. These are outside of the compensation program but if someone is funded to rebuild they must rebuild according to the law. So if they happen to be in a building that was not in compliance with current law like maybe they were too close to the vulnerable area or they were not elevated enough or whatever, when they are given

compensation they are required according to the current law. That is not a design of the compensation program but that is how the various land use plans and other regulations can be used to reduce risk. . (12. C9; p. 2).

12. Local watershed groups are amazing at bringing together local community:

R They have been successful in bringing together all the various interests groups for the most part. So it just makes all kinds of sense that these groups need to be more involved in the water management of these watersheds. We have to find where it is the provincial interest needs to be continued, to be averted as opposed to letting the locals run their business and do things in their interests. Absolutely I see them as being very important and need to be supported (15. S2; p. 12).

So I think there is that element but I think there is also the element around governance as well like if I look at the example of the Watershed Associations and of course these are small non-profit organizations and of course like many other non-profit organizations you know a lot of volunteer dollars, limited dollars perhaps to initiative projects but the ability for communities to communicate. (07. S5; p.2).

13. There is seen to be overlap between all the emergency response organizations and departments.

R I look at them as a set of diagrams. There is a huge amount of overlap and sometimes they are concerned about the same things but sometimes they are not for example a business continuity professional is concerned about recovering his own organization and that is it. So he will overlap with an enterprise or a risk and insurance manager but that risk and insurance manager he is concerned mainly about just funding quite often the recovery. He is not concerned about the actual business processes and the risk manager will also be concerned about broken windows which the business continuity person isn't concerned about at all. If you deal with a disaster emergency manager for a city he is concerned with recovering his entire society that can be damaged by a disaster. A business continuity person is only concerned about his own organization. So one is externally focused and the other is internally focused, and if you are a first responder you are worried about disaster from getting in there and putting out the fire and rescuing people. So it is really a huge amount but there is also a lot of difference as well and the worst part is the language is just similar enough to be confusing. So if I say disaster management to a business continuity person he will think a very, very early form of business continuity that deals mainly with IT and recovering the computers. If I say disaster management to a disaster emergency manager he thinks this broad brush recovery of society with the four or five pillars of disaster and emergency management. So those are two diametrically opposed concepts that have almost the exact terminology.

(11. C8; p. 2).

14. The Canadian disaster database is not without issue. Drought has been taken off of it:

So I think at some point over time the drought related ones which usually came up very high when you sort them in terms of which are the most expensive had some values assigned to them that were not as rigorous as some of the other ones in there. So it looks like all the events are still in there and they are still at least 1,000 different disasters over the last 100 years that are all in this database but most of the drought related **ones they have simply taken out some of the information about trying to guess how much the cost was because I think they were probably told by somebody in the know that the quality of that particular number wasn't all that good.** I don't know the exact story about why they took them out but I remember when I looked at them I went whoa where did that come from. I mean there are some figures being discussed right now about the damage in southern Alberta and in Calgary and this is just much too early. If anybody used some of the figures that are out now that the media and others are doing they are very, very preliminary numbers that are full of assumptions and whatever. So there are events where the data is quite rigorous. If you take the wild fire that was in Slave Lake I mean you can count the houses, you know how much it costs to rebuild them and we know all the cheques that have already been written by the government and by the insurance industry. So you can have a very rigorous number for some of these events but for the drought I am not sure where they came up with those figures. (12. C9; p. 7).

Well you should ask the people running the Canadian Disaster Database so Public Safety Canada have a couple of staff up there now who can answer questions about exactly how the database was pulled together and again it is still a little bit patched together because 99% of the disaster payments are not made by governments. Most of them are made by private insurance certainly 90% if not 99% so they still have to rely on somebody to get the data for their story. (12. C9; p. 7).

Those are fascinating questions and there is a whole literature on managing databases and the International Council for Science over in Paris has a series of publications on how to best keep disaster databases and they have a working panel that includes the three big databases, the International Red Cross, the Munich Reinsurance Company and the Swiss Insurance Company and the three of them meet with a group of interested government and other stakeholders and they have been meeting for the last five years on the quality of disaster data, how to improve international databases. I am not certain how formal the Public Safety Canada effort has been but there are some of these global efforts trying to get good data. If you choose one part of the database and I will try to be careful in my language here, but anyway to some extent has been misused by the climate change community using this Canadian government database. You will find that the number of disasters in there increases every decade and increases very significantly every decade. We have almost no events in the period from 1900 to 1910 but we have more between 1910 and 1920 and even more and I am not convinced that is climate change although some people have suggested that it is and I think that is the way the data are collected and put into the database. We don't have as many people to remember what happened in 1910s. (12. C9; p. 7).

5.3 Actual Events & Institutional Support

The local community vulnerability reports of the VACEA project should be referred to for the most part in relation to the experiences of local community members in times of drought and flood. However, the Institutional Governance Interviews did probe in relation to events of drought and flood in the knowledge base of the participants. The Alberta High River Flood of 2011 was still very much on the mind of interviewees and therefore was covered albeit it was not within the study areas of the VACEA project.

Members of the community interviewed recounted that to them it appeared there was mass confusion and that no one was in charge. Further there was great dissatisfaction with the RCMP who forced evacuation and then proceeded to break down doors of the deserted houses in order to seize guns. This action resulted in damage to the houses and left houses open to the elements and other vandals. It appeared that flood maps in the area were old and out of date. Although flood insurance isn't available, some were lucky enough to qualify for sewer backup insurance. However, financial compensation for the disaster to homeowners was inconsistent depending on insurance companies, adjusters, types of insurance homeowners had. Disaster assistance didn't provide for full recovery and certain aspects of community damage were not covered. People who were employed in small business and not homeowners were lost to the community. Many residents suffered health impacts such as heart attacks as a result of the flood. Another undocumented aspect was the high levels of debt some of the community members incurred to restore their homes because expenses weren't covered by insurance or disaster assistance.

1. When an actual event occurs, the municipality is the first responder:

In Canada a lot of times people form their opinion about how emergency preparedness works based on the US model because that is what you see on television all the time and they are totally opposite from each other. In Canada emergency preparedness starts at the municipal level and responsibility is totally with the municipal level. When it gets beyond the control or the capability of the municipality, that is when the provincial level kicks in or actually there is another one which is mutual aid, if it is there, will kick in. So one community will help the other community and those types of things and then the provincial level, the provincial aid or provincial emergency measures management organization. There have been so many name changes in there so I will quote one or the other. They change their names every two years. (04. S7; p. 1).

2. In 2012 Alberta experienced flooding in many communities. One of the most impacted was High River, Alberta. Although not part of the study regions of the VACEA, this flood was discussed with the governance interviewees in the Alberta and federal government as well as residents. The area of the flood was greater than High River:

There was I think 28 local states of emergencies for all kinds of sizes of communities and some you know the biggest population base anyway being the City of Calgary, so it was very much the waters came in and there were communities that were completely surrounded so everybody had more than they could handle. So it was quite something. I think at one point close to 100,000 people had been evacuated in a very, very short period of time (02. A2. p. 5).

Here High River was really in the middle of this massive flood and everybody was maxed out and High River tended to be or appears to be one of the hardest hit areas so they were nearly obliterated and there weren't people around them that could help. So everybody else was at the absolute limit so we were kind of really the last resort because for many days they were managing the response but for example their people, their crews, would get exhausted and there weren't crews to replenish them so we would have to bring in people and expertise (02. A2. p. 5).

3. In the Alberta 2011 flood, the province got involved because of the geographical scale of the flood:

So with flood, the Alberta Emergency Management Agency, which is sort of the government provincial scale emergency response group, the way the legislation acts is the initial responder to emergency is the municipality whether that is a rural municipality, or a town or whomever and they are meant to be able to respond to a certain suite of things. Now if they get out of their depth then they can declare a state of emergency and the province can assist and often the province will start assisting even without that declaration and that is where you see AEMA set up a local operation centre helping to coordinate resources and things like that. The districts plug into. Formally I am not sure how they plug into that but they are on the ground so that when the local municipality say the rural municipality is making decisions and moving resources and taking action, the districts especially in things like flood like we saw in 2010 and 2011 they are right there with their resources as well because as we talked about earlier you know a lot of that flood water either naturally or with help from people that water ends up in the irrigation system. So they are hand and hand with the municipality. I couldn't tell you if that is a formal relationship or not. When they activate an emergency operations centre it is sort of all hands on deck. When a municipality declares emergency they have certain authorities to manage infrastructure or private infrastructure. Typically it doesn't come to that but it is all hands on deck. You see the fire department is there, the irrigation district is there and we are even there because we have certain pumping equipment that we can bring to bear. It is not meant for that but when things get tough then we can add it to the mix of resources that are available. On drought the AEMA doesn't typically in my experience get involved in drought because it is not that quick emergent type of emergency. It is more like the slow moving train that you can see coming. So districts obviously very much involved in their own operation and they are essentially there for drought proofing. So they operate their own works. Now we have this thing in the province called the drought and excess moisture advisory group. It is relatively new. It existed in another form but this new form is only a couple of years old and I am not sure if

AIPA has seat at that group or not. I will just find it here real quick. Yes the irrigated crop sector does have one representative on that we call it the DEMAG. I have a sneaking suspicion that it is AIPA that sits there but I don't know that. (21. A3; p. 14).

4. During the Alberta floods of 2012, volunteers came from all over Alberta to assist:

IV So you said you got the buckets from the Red Cross, did they do anything else or they were just there giving those kinds of supplies?

R No they were just giving those kinds of supplies, but we had hundreds of volunteers come in from Mormons, unbelievable the support from the Mormons, they came in by the car loads.

IV And where did they come from?

R Just everywhere.

IV So just surrounding communities.

R Yes and I mean we weren't the only community that was hit. You know there is Black Diamond and Bragg Creek and a lot of other communities around were submerged in this water. So Lethbridge got it and I mean if you were on a river you got it sort of thing. There was the Red Cross, Salvation Army, just everybody that does any of that kind of work. We had people coming from Calgary, just housewives, who would come up with a car load of sandwiches and stuff like. There was nowhere to eat, and of course there is still nothing open in High River. There is only one restaurant open that I know of and the main street of High River is just empty, nothing is there, the banks aren't open. The banks brought in portable bank machines so that you get cash and deposit and things like that but the big food stores got opened within probably three-four weeks and on a limited basis of course and we have two hardware stores open now and it is coming back but it still has a long way to go. You know the sad part of it is there is a lot of people that won't be coming back because if you had a business and had not only to fix up your store but buy stock and you have got a bunch of poor people here that are stretched to the limit with looking after themselves they don't have any surplus money for anything. (05. A8; p.5).

Yes people following the water levels but we also ended up with some of our wildlife enforcement officers because they had the right type of equipment. They were helping the local police authorities evacuate people. So it really gets to be an all hands on deck situation where it is needed and the Canadian it is a really good news story that we don't have the same thing that you might hear about when you hear police investigations and some bad guy getting away because different levels of police weren't talking to each other. We tend not to have that in these sorts of situations.

IV Right and when that happens I know that there are agreements where fire services will come and help another locality and they have written formal agreements for that

but what you are describing with the wildlife officers is they probably just pitched in (01. C4; p. 10).

5. Community is important in relation to drought and the event of fire:

R I don't think the situation has come where there is no water so in terms of having to work in an emergency response, no. Now that said I will tell you one situation that due to drought districts worked with emergency response and it is very specific, however, very important. When we have dry conditions here we can have fires and so there were major grass fires, either last year or the year before. I can't remember time goes by. Well major grass fires west of Lethbridge and also west of Milk River happened and so in cases of fires that were on the reserve and west of Lethbridge, there were two fires that way, then water bombers went on to Park Lake reservoir and took water out of there and I have to add a joke here, without a water licence, so technically they are breaking the law, so they went on Park Lake and they got water and they were able to go bomb these fires. So was the district supportive of that? Of course, no questions asked and so again it is the community working together for the benefit of the community. In the case of Milk River the people in the Town of Milk River were evacuated and they actually came to the town of Raymond and those that wanted had food and shelter and a gathering place, a place to contact family and that kind of stuff. So again this is a community happening and larger communities and those two communities are not buddy buddies but they were very congenial at the time. (24. A5; p. 8).

6. The Alberta 2001 drought and water sharing practices were referred to by interviewees as constructive response to drought:

IV Okay so in the event that there is not enough water for the allocation?

R Yes that is a good way to put it like the year 2001 was a prime example.

IV Right and actually I know a little bit about that from previous work and what happened with the water sharing that went on with that.

R Something a bit like that happens within districts. Districts in a drought have a right or the ability to manage their licences within the confines of the bounds of the licence. So the districts hold the licences themselves, the individual growers do not, so then the district can then do some assignments to their growers under those licences and how they do that is at the discretion of the board. So each district has a board that can make decisions on that. Some of them do have drought plans in place so that if that happens then the structure or framework is already set up for making decisions and the key thing in there is that districts can then let a free market system happen within their district. Normally each district will say to their district members, "okay this year you can have 14 inches of water, that is what the water allocation looks like it will be, the water supply" and it is not based totally on their water licence. It is more how much water is in the reservoirs and how much snowpack and snow melt there is. So they make that decision every year as to how much water they will allocate over a district. Now let's suppose that instead of the usual 14 or 15

inches there is a drought and the water supply now is 8 inches. So say it was half. So the district will then say and within the district you have the right of redistributing that water. You may use it on your own parcel and not on another or you may actually sell your rights to that water and we will deliver that water to a different parcel. So this would work in the case of high value crops such as potatoes, sugar beets or sweet corn or something like that that must have the water. So the individual farmers then will make deals one with another on reallocating their share of the water and that is usually market based type thing. (24. A5; p. 2).

7. Often emergency plans are sitting on shelves collecting dust and no one has read them. For example:

At 2:00 am the fire department phoned the city manager and our fire department who was supporting Grand Coulee fire department said we have got this fire and we are anticipating that by morning the winds will be coming from due west. We have no idea what is in there but all we know is that there is every colour in the rainbow burning in this fire and we know we have got tons of pesticides, tons of all sorts of stuff and this building is on fire. So at 2:00 am the city manager called the mayor and whoever else and they walked in and sat down at a table in city hall, reached up and pulled the blue binder out, which I still have a copy of, sat it down, blew the dust off of it and opened it up. They opened it up and it told them nothing. It told them who was responsible for certain things but nobody had been trained, no finances had been put in place. It just basically said who is responsible and that was all in the emergency plan (04. S7; p.4).

8. Often at the time of the emergency, municipal people are shocked to learn of their responsibility:

We saw many municipalities in 2011 and we knew we would and we do all the time with every type of emergencies, but in 2011 it really highlighted it because there were so many municipalities that had an emergency. Many, many of them said hey I signed on to be a Mayor because I was worried about garbage collection and grading the road. That is it. That is the only thing they govern so what is the challenge that we face and I am in the emergencies and disaster business the reality is there is very little capabilities or capacities for local governments to actually govern. (08. S4; p. 4).

9. After an event, remediation and planning to avoid a future event is undertaken. However, responsibility is not always government's:

So they know how to do it better in terms of dispersing support, persons, equipment, having equipment available at hand, in storage, dispersing it, educating local EMO officers and that was observed by many people this time when they started talking in March early April about a significant flood similar to 2011 communities knew what to do and with our emergency response program they knew what to ask for and so communities took action and took action on their own clearing snow out of drainage ditches and acquiring sandbags. You know Katepwa the local resort village out there

they bought a whole bunch of sandbags on their own. So everybody was better educated, better informed to take responsibility and there is a better understanding of local responsibility. We have responsibility to respond. We shouldn't be depending entirely upon government to prevent our problems (15. S2; p. 3).

10. Irrigators in Alberta are starting to plan for flooding:

IV So what happened in the situation of flooding with the irrigators this year or any year?

R Well this year wasn't an issue. You need to understand the structure of a canal system. So a canal system is built wide at the top and narrow at the bottom because in that case you have withdrawals all along the canal. A drainage system is built narrow at the top and wide at the bottom because it picks up more and more water as it goes along. A lot of people think canals should be the drainage system but it doesn't work. So when we had flooding in the spring there were reservoirs that had major inflow from flooding. You cannot top dams or you are in real trouble and so you have to spill water. As you spill it down the system you have to spill it out at the end of your canal back into a river or something like that. Well when farmers or MDs want to use the canals as drainage systems as well as us trying prevent over topping of dams on the reservoirs then you get in a situation where there is flooding downstream that shouldn't have happened but it did. So just due to an act of nature you just have too much water to handle and there is no drainage system built to handle flooding per se. So one thing that is happening right now is that a number of districts are trying to pursue money from the government to build what is called a "spill channel" so that in the middle of the system, not at the far end of the system, they can actually spill water into the Oldman River instead of running it down through the canal system all the way to Medicine Hat because then of course you have accumulations of flood water coming into the canal on the way there. You just would like to get into the river sooner. Now that may cause problems for people downstream but even if the canals weren't there it still would have happened. Flooding has been an issue. There have been some losses because of people being flooded by water in the canal used for drainage system. (24. A5; p. 5).

5.4 Insurance (Flood & Disaster Assistance)

In times of drought and flood, crop insurance is the predominant adaptation offered by provincial and federal governments to assist producers and reduce their vulnerability to drought. The suite of instruments detailed in section 4.5 is also available. Some producers are unable to afford crop insurance and elect not to engage this adaptive strategy. Hail insurance is also available to producers and is provided by insurance companies (non-governmental organizations).

In respect of flood, there is not insurance available in Canada for residential home owners. Commercial flood insurance is available for businesses and the cost of this product varies depending on location within or outside of flood zones areas, the type of business and other factors. “What is not available in Canada is residential overland flood insurance and we are the only G8 country that doesn’t have some form of residential overland flood insurance available” C2, p.13).

During the High River flood, some home owners were able to access insurance policies through provisions for sewer back up in their policies. This would be the case if their home suffered from sewer back up and this event occurred prior to the flood waters leaking into their homes. These provisions are not present in all insurance policies, only some of the policies. Also, if homeowners suffered damage from flood waters, before their sewer backed up, they would not be able to claim for this damage. Interviewees noted great disparity over what people were paid or not paid for and how they were treated by adjusters and different companies.

In the United States flood insurance is available. It is provided by a national governmental program. Interviewees were mixed on whether having such a program in Canada was a good idea, or not. In Canada, the reinsurance companies have determined that it is not a viable business to provide flood insurance in Canada. This group is very savvy about future climate change and the impact on insurance payments.

Because there isn’t flood insurance, the federal and provincial governments provide disaster relief. Details of disaster relief payments and applications can be found on line for each of Alberta and Saskatchewan as described in section 4.6.

Both insurance payments, and historically disaster assistance payments only provide for rebuilding. There is now provision in the disaster assistance plans for some mitigation, or building to higher standards to build resilience. The reinsurers generally work through building codes and lobbying for legislative measures in this regard.

Because there isn’t flood insurance, and because the federal and provincial governments are paying for homeowners’ losses, the issue of living in a flood zone becomes a “moral” hazard. The key issue is whether society should pay residents, and how often, to compensate them for the loss of their house when they live in a flood zone. The individual has made a choice to live in this area; however, society is effectively insuring them at taxpayers’ cost.

The vulnerability of society is increasing in respect of floods (for example more people have finished basements with expensive technology in basements), the frequency and se-

verity of floods is increasing with climate change, and the amount the federal government is paying out in disaster assistance payments is increasing exponentially over the last decade. From 1970-1996 payments were on average 13 million per year. From 1996-1998 payments ranged from 15 to 110 million per year. In 2011 it was 300 million and it appears to be approximately 600 million per year over the next few years, and the government is budgeting for 750 billion in the next decade (C2).

1. The following excerpts reflect people's perceptions surrounding flood insurance and payments. Flood insurance is not available to private individual home owners in Canada.

There is no such thing as flood insurance in Canada I understand. Nobody has flood insurance so that is over land flood so what you have got is you pay extra for sewer backup and our house has a valve in it that is supposed to stop the sewer from coming back but they don't really work (05. A8; p. 7).

So one of the biggest challenges for Canadians and for those of us following the industry is communicating as clearly as we can what is covered by government programs, what is covered by private industry. Certainly going back to the founding of the disaster financial assistance program back in 1970 the funds available from the federal government to compensate the province are laid out and a very clearly defined set of rules and it says if something is not covered by private insurance, then the province costs can be recovered on a sliding scale from the Government of Canada and the vast majority of that has been related to overland flood damage but there are many, many different aspects of water damage which are covered by private insurance and that is not communicated terribly well. If you have water that gets into a home and it comes from a river overflowing its banks and cuts through the doors and the windows that is not covered by private insurance in Canada although it is covered by insurance in most other countries around the world. If the water gets into the house in another way like the sewer system backs up which is now a two or three billion dollar a year problem across Canada affecting almost all of the urban centers, that is covered by insurance and something like 80% of Canadians have insurance against that and it is the single largest cost, larger than fire or theft or anything else for insurance companies is flood or basement flooding related issues. Then the losses by private industry are not covered at all by government programs so if a business or a commercial entity experiences a loss then the only protection that they have in place comes from the purchase of private insurance and in this case overland flood insurance is available from the private sector. So anyway it is a complicated area, water damage is sometimes covered by insurance and sometimes not and sometimes covered by government programs and sometimes not. (12. C9; p. 2).

The insurance companies are walking away and the government has put some pressure on these insurance companies and some of the people have come back, some insurance companies will pay for three or four feet of water in a basement, even though the water went to the ceiling. We have a big house and we have a very high basement

and so we were lucky that it didn't get up into all of the rafters and stuff like that. (05. A8; p. 7).

An RFP has been put out by Public Safety Canada to examine the state of flood plain mapping in Canada. So I can't remember if the media report was MacLean's or somebody else that has released that and so they accessed some information through accessed information and also through discussions with the Institute for Catastrophic Loss Reduction in the Insurance Bureau of Canada to have some specifics on that RFP.

IV So that was the Insurance Bureau of Canada?

R Yes and the actually proposal, the RFP, has been put out by Public Safety Canada.

(09. C2; p. 3).

IV So in some areas of the country flood insurance is available.

R Yes so commercial flood insurance is available just about everywhere. Now there are some places where it is not affordable because if you are building on a flood plain and trying to operate a business there, insurance providers themselves will decide not to make it available or it will be available at such a ridiculous rate that it is just not affordable but certainly there is no province to my knowledge where commercial flood insurance is not available. You are also questioning that sewage back-up is available in a number of jurisdictions in Canada and again that is at the discretion of the actual insurance companies. What is not available in Canada is residential overland flood insurance and we are the only G8 country that doesn't have some form of residential overland flood insurance available (09. C2; p. 12).

As is well known insurance does not cover you know surface flooding. I think in almost every jurisdiction in Canada, it is not all of Canada which is unlike some other areas, but the coverage is not as wide spread as maybe our public thinks. You know insurance folks have been really nailed. They have in the last five years been paying more than a billion dollars annually now. Of course we don't necessarily know what the revenues are so whether that is really a hit on their bottom line or not, I guess we are not that sure about, but there is no doubt that statistics show that flooding and that sort of thing has now become the number one source of pay-outs for insurance companies in Canada. What causes all floods of course is extreme weather events based on flooding and that sort of thing. So that you know the insurance company is very engaged in this. (16. C5; p. 8).

2. For producers, crop insurance would be available for crop losses in the event of a drought or flood:

So crop insurance was the mechanism to provide funding support to producers suffering from drought?

R Yes well this was on flooding but same thing.

IV Flooding, okay, so drought and flooding because there are also disaster recovery payments.

R Yes like the provincial disaster assistance program there is that program but it doesn't cover crops. Crop insurance is meant to cover losses from crops but you buy the insurance and if you don't buy insurance well then you are not covered. (14. S3; p. 8).

Exactly and if then the government changes its mind and give some sort of payment then I remember they somehow link them to the crop insurance.

R They didn't in 2011. There was some ad hoc payments made to everybody that was sort of impacted but like crop insurance has what they call an unseeded acreage program so if you can't seed because of too much water okay well we will come out and assess the damage and you can get an insurance payment but you have to buy into it. **After that happen then the minister said no more if you want to protect yourself treat yourself as a business, buy crop insurance.** (14. S3; p. 8).

Well I mean people have got to do their own risk assessment that is all. If I want to run a business that I think I am vulnerable to flooding or to drought, I should be prepared. The other thing is that the comfort zones of different people are different. You know I might be really risk adverse and other guys might not be so my neighbour he wants to have crop insurance up the waszoo because he is just scared of any kind of disaster and I might be saying you know what I don't worry about that because I am going to go out and I am just going to buy myself two years of feed and a drought hits and I am taking care of myself because I have hay in the backyard and all of us differ or you know somebody will always have a bale for me or something. We saw that this spring too. You know guys just weren't ready but it is just how different people react but what I am saying I guess is that the governments have to be more proactive in having tools or programs available that people can take advantage of to help them better prepare themselves and they have got to advertise those programs too and they have got to get out and network and try to encourage producers and make sure that people know that they are there. The producers or businesses have to be open to that as well too. (14. S3; p. 14).

3. Insurance is really part of a suite of policies and tools to respond to events of disaster:

There was the support mechanisms in terms of in the middle of the event like helping both individuals and the communities and working in partnership with the communities to try and find alternate water supplies in sort of what we will call an emergency situation and potentially even in a longer term situation and then there were the insurance programs and the income stability programs so we didn't lose an industry. I think those are all the appropriate package of things that should be done in order to help Albertans and to help a particular industry base that strongly supports our rural communities. (17. A4; p. 10).

4. In the United States flood insurance is available as there is a national government program. This program received mixed reviews:

R Certainly there are models in the world where it is only the private insurers. There are also models where it is a nationally regulated model and there are other examples like the US where it is actually just a national government program and it provides the flood insurance.

.... Yes so certainly in other jurisdictions internationally there are all kinds of different examples and we know that there are some provincial kind of cooperative studies that are happening right between different insurance providers and other insurance industry players and different levels of government trying to crack that nut. (09. C2; p. 13).

The whole mitigation thing is so darn expensive. Flood insurance is not really a viable option. We don't want to go the route of what they have done, the same route as the states because one flood and you are out sort of thing. So it leaves a lot of people still sitting with major damage resulting from floods and there are people that can't move out of the location they are in for the reason that they can't afford to move (10. A1; p. 10).

What they have in the states is a government run flood insurance and it is sold through the private insurers but it is run and funded through the government. What the problem is we seem to take an all covers policy so again it is the negative incentive and the moral hazard, people just keep rebuilding in the flood plain.

IV Okay and we don't have that here though?

R No we don't have that here for residences but we do for businesses but the idea is that the businesses are zoned more carefully than residential risks which are true but only to some extent. You still will have in Ontario the floods that come through and flood a lot of businesses. You had that in Quebec in the Sagoney flood, you had that out west you know with all the floods that come through Manitoba, but at least in Manitoba they have a dike, the diversion around Winnipeg. (11. C8; p. 9).

So we think extremes to choose the Canadian story, the largest loss experienced by private industry right now have been related to extreme rainfall events and losses have increased many, many fold in terms of severe flooding in communities all across the country and it is transforming how the insurance industry is doing its business in Canada. (12. C9; p. 2).

- 4. One of the most important aspects of insurance relates to reinsurers (those companies that interface between world financial markets and insurance companies, buying insurance products, assessing global risk, setting prices, and making decisions about what is and is not insurable). This group is responsible for the decision not to insure floods in Canada. Reinsurers are very informed about climate change.**

The insurance industry and many of its writings have been concerned about climate change. Do you know what a re-insurer is well re-insurers are very heavily concerned about climate change and many of the presentations the ICLR will talk about climate change and I think they have also built some of their lobbying about building codes and so on it takes into account severe weather which may be affected by climate change. (11. C8; p. 4).

So it strikes me even from what you stated the insurance industry and the re-insurance industry keeps their eye on climate science.

R They try to.

IV And the government tries too but this uncertainty issue is obviously a problem in relation to the public.

R The thing is that the uncertainty issue to some extent is deadly for the insurance industry because the insurance industry does most of its work it has in the past on an actuarial basis. The past is the key to the future. Well the thing is so you are using a deductive methodology and you are using numbers that go back as far as you can measure, and from that you are trying to come up with a rate. If you have climate change in any manner whatsoever, and actually just general sociological change thrown on top of that, that throws your numbers out of whack and means you have to go from a deductive sort of concept to an inductive modelling and the inductive modelling as you point out is very, very sparse and has a lot of potential error in it and you can't be really sure as what you had before like if your conservation is out there measuring a flood they are measuring it with sticks to the nearest millimetre. If you are trying to use a general circulation model I mean you have got 50 x 50 mile cells with massive differences between those two cells. The problem for the insurance industry and especially the re-insurance industry is that all of your numbers are blown away by the uncertainty so you don't have the ability to calculate rates with at the least the illusion of certainty that you had before.

IV Okay. So my hypothesis that perhaps the insurance industry was playing better for this than government is perhaps failing here. Everybody is having issues.

R Well they are having issues because they can't quite figure out how to do this. I mean if you always on to [word] is a deductive actuarial way of doing things climate change throws a lot of your numbers out the window and you have to start moving to these more inductive models. Now they are trying and they have a lot of these models but translating those models into dollars is not easy by any stretch of the imagination. It worries the heck out of them. The other issue is that if this climate change happens slowly enough on a nice even curve well that is fine because then they can build up reserves and change their rates to handle that curve. As you and I know though that doesn't happen in reality, things go up in steps. So if you go up by a threshold that can create a lot of problems in terms of rating but yes they are doing a lot of research on it, they are talking to governments about it. If you look at Trishtree Insurance and Munich reinsurance they have been sounding the alarm for the last 15 years. I don't whether maybe they have been over sounding the alarm and

whether their science is all that great, but they have been, and they do a lot of work on it but they are still having problems like everyone else in trying to take the science, the general circulation models, cap that back to actual events that would cause claims, and then tack that back again to actual numbers in terms of dollars not to mention that on top of that your sociological change. So if you go down to say some of the far eastern countries you can say oh that storm caused X million dollars of damage well was that due to climate change or was that due to the fact that they have all become far more modern and are building buildings now that are far more valuable and have a lot more to lose. Which is it? Well probably both. (11. C8; p. 6).

And insurance and reinsurance may be part of the adaptation you know because if you have a pool of money that pool of money allows you to recover. The insurance companies are just pools of money in many ways and the reinsurance companies are pools of money for the insurance companies. So if you basically allow cut attary on a re-insurer to allow it to accumulate more money but it is strictly for its catastrophe funds and basically insure then that the money goes back into those catastrophe funds instead of taking it out just for profit. That in itself is an adaptation because you know your adaptation can come in several ways. Most academics tend to use adaptation in terms of building codes or not building in flood plains, or planting especially ecological and creating ecological areas to handle floods and storms and so on or you know looking at ways of evacuating people, but if you have got companies who for example have more business continuity plans who up their risk assessments of where buildings should be, insurance companies create larger pools of money or say in Ontario or Canada the Institute for Catastrophic Loss Reduction was talking about methodologies by which insurers could cover floods. Those are all adaptation methodologies as well and they are over and above what most academics generally think of. (11. C8; p. 7).

...the re-insurance area of course there is I understand some like their Munich Reinsurance, Swiss Reinsurance which are probably the two biggest ones that operate in Canada and those are the guys that actually for an office tower they will actually provide insurance for an office tower. You know it is not done necessarily insurer like it will be done through an insurer but the real insurance is provided by the re-insurer.

IV So it is Munich and Swiss.

R Yes Munich and Swiss. They are the two largest reinsurance I think even worldwide but they are the two largest ones in Canada. (16. C5; p. 10).

Do you know what a re-insurer is well re-insurers are very heavily concerned about climate change and many of the presentations the ICLR will talk about climate change and I think they have also built some of their lobbying about building codes and so on it takes into account severe weather which may be affected by climate change. (11. C8; p. 4).

5. However, the product of insurance often only allows rebuilding, not building to higher specifications in light of climate change:

Certainly in private insurance that is part of the design of the product that insurance is to put you back in the state you were in before the flood occurred. If somehow you were in a vulnerable area and you had insurance, then insurance puts you back certainly commercial entities that would have insurance, homeowners that have sewer backup insurance those sorts of risks, they put you back. Where there has been an opportunity through government regulations to try to reduce future risk that is affected by how some of those compensations pay that is outside of the compensation program there are many different rules about where properties are allowed to locate and building requirements about flood heights and construction practices. These are outside of the compensation program but if someone is funded to rebuild they must rebuild according to the law. So if they happen to be in a building that was not in compliance with current law like maybe they were too close to the vulnerable area or they were not elevated enough or whatever, when they are given compensation they are required according to the current law. That is not a design of the compensation program but that is how the various land use plans and other regulations can be used to reduce risk. (12. C9; p. 3).

6. There are attempts within the insurance industry to have people plan for risk:

Oh yes like because if it is sewer backup then they offer that and now one thing that I have heard that they do and I actually experienced this year myself in my own policy is that they cap the amount they will pay for sewer backup. So it is not sort of an open cheque. They will put a cap on it and part of that is because folks now are using their basements a lot more in terms of recreation and they upgrade their basements and that sort of thing so the cost to replace what is there is much higher than it used to be in the past. So that has been a trend that has been very clear especially over the last probably 20 years or so and so insurance companies are definitely engaged in the issue. They are trying to find ways to encourage homeowners to kind of upgrade themselves for existing housing or encouraging builders to adopt a few practices that would again improve their own liability and the resilience. On that example it is putting tie down clamps on garage roofs because what happens is if you get high winds or say a tornadoes and we are getting more tornados in Canada, what happens is the wind gets underneath the roof of a detached garage and tears it off right because it doesn't have much resistance to that. So that of course is a big issue so a simple thing that would cost about \$100.00 in the construction would improve the resilience of these roofs getting ripped off by winds or updrafts. So simple things like that they are advocating for and a lot of it is public education but also talking to builders and that sort of thing to try and convince them and the codes people. I know they have approached the Ontario building code for some changes to the code to accommodate some of these things and those are being considered. So I think there is pretty good engagement and there is a little bit of mistrust I think for sure about insurance companies because you know they would admit they are in it obviously for the money but you know I think it also just good practice to obviously reduce impacts and mini-

mize disruption and damage which is just a good thing in general whether it is insurance or not. So I think there is a decent common agenda and maybe they are in for slightly different reasons but still the objective is the same. (16. C5; p. 9).

IV Are you talking about insurance or reinsurance companies or both?

R I would talk about primarily like the Insurance Bureau and its affiliations so the industry association for sure is quite engaged, some of the individual companies are more than others but it is an incredibly competitive business and they tend to not share amongst themselves. You know if they have got some inside information about an area they may not share with their competitor down the road because they want the business. So there is some of that going on as well but I do know that there are some individual companies that are far less aware of the issue and I think they rely on the insurance bureau to look out for their interest and the insurance bureau is the representative for the insurance companies and

7. When an event is not insured, and government or an individual ends up footing the bill it is generally referred to as a “moral” hazard. Should society (the government) pay residents along the California coast who are well aware that at some point their homes will be destroyed by an earthquake? Alternatively, is this a hazard homeowners in this region accepted?

It is a huge issue the moral hazard and morale hazard. Now this is not an accepted term in the industry but it has been used to some extent is the difference between a moral and morale hazard. All hazard is when your insurance system forces people to do something either fraudulent or encourages them to do fraudulent or illegal. A morale hazard is when it encourages them to do something that is just stupid. (11. C8; p. 7).

That is an interesting one kind of that moral hazard versus insurance/government because I don't know how the insurance works on that I suspect it is kind of like Regina once you have been flooded your insurance is either really, really expensive or you can no longer insure for that event.

R I mean if you get broken into three times you are done or you make three claims, you are done they won't insure you anymore. (15. S2; p. 4).

8. Now the government is paying for these, at the expense of taxpayers. At the time of the flood, it is a political event and politicians earn goodwill offering “disaster payments”. One important thing to keep in mind in relation to the increasing frequency and severity of floods, is the fact that our vulnerability as a society has increased in respect of flood:

...and do you know why it has increased so much over time? Well it is because the footprint of urban communities has increased so much.

IV Is that a natural science kind of thing?

R Yes. So assume we have all of the same statistical randomise of hail events in Alberta that we have always had yet damages have gone expediently above inflation. Why is that well because we have increased expediently the area, the footprint. The City of Calgary is 50 times what it used to be 20 years ago. So is there 50 times the damages, yes there is but anyway that is hail and typically that is handled by insurance companies. You can get a comprehensive crop insurance program but generally that is government run but you can have it because you can include many things. You can include in it drought, flood and blah, blah, wind and hail and you can package it all together so that distributes the premiums among a broader base of people. Floods as far as I understand and the last I knew you could not buy private insurance or a river over flowing its banks flood. You can have it for sewer backup but you can't have it for a river over topping its banks. It is not offered by private insurance companies and why is that because the area of flood risk like in Alberta there are only 34 communities and only specific parts of those communities are at flood risk and so therefore there is such a small number of people that are affected by it and when they are affected they are all affected and so therefore it isn't truly an insurance program that can be spread over all of the population of the province of Alberta. (17. A4; p. 20).

During our 16 years of operation we have seen losses in Canada increase at an alarming rate and global reports showing similar trends happening in countries all around the world. This is coincidentally happening with climate change and more and larger extreme events occurring. Much of the evidence suggests that most of the increase in losses is actually driven by factors that are not climate change. We have more people choosing to live at risk, we have behaviour change that is increasing our vulnerability, we have infrastructures that are aging, and we think climate change will become a growing part of why costs are going up over time. We don't think it is a driving factor to date but it is certainly one of the things that we believe has already started to increase costs but will over time become a very significant factor. So we think extremes to choose the Canadian story, the largest loss experienced by private industry right now have been related to extreme rainfall events and losses have increased many, many fold in terms of severe flooding in communities all across the country and it is transforming how the insurance industry is doing its business in Canada. (12. C9; p. 1).

Yes they were complex before for sure. If you look at a flood of a 100 years ago to a community like Winnipeg right before the bypass route was created, it was complex in the community and certainly devastating. Nowadays disasters are more complex because first they involve a lot more people, two they involve a lot more infrastructure and with every impact that infrastructure has a ripple effect beyond the community. A very quick aside, if you look at southern Saskatchewan and the flood down there, just a washing out of the main highways automatically stops the exchange of goods and services. So I need not go there any further. Just a washing off of a rail line in British Columbia, Alberta, Saskatchewan creates a bottleneck of resources and raw materials going out through our shipping ports of the world. So the level of

impact of disasters now has a further field, reach and damage than before. So that is your first one. The other one is because you are now involving more agencies than just the public sector and because they bring so different, so unique and demanding jurisdictions the management of that is becoming more and more complex. (13. C7; p. 7).

9. Disaster assistance payments made by the federal government are increasing:

Yes that is what we have been using and these I think are available somewhere on the Public Safety Canada website but basically before 1996 if we talked about the disaster financial assistance arrangements program, it operated between 1970-1996 and averaged about \$13 million per year in payouts in total. In 1996, 1997, 1998 we got three really big disasters in a row Saganay River, The Red River flood and then the ice storm and all of a sudden that average disaster loss jumps from \$15 million to \$110 million a year and then it sort of chugs along at \$110 million a year average until 2009 and then it jumps again in 2009 and it jumps most significantly in 2011 when we get up to just over \$300 million a year in disaster losses and now this year it looks like over the course of the next five years if there are no other disasters we are now over \$600 million a year in disaster loss payouts under the DFFA. So if we look at that trend again going from pretty consistent from the 70s to 96 and 96 takes a jump, it jumps again in 2011 and now it doubled from 2009 to 2013 and that is for the next five years if that funding is already notionally committed and that is assuming no other disasters happen. So it is quite probable that we are going to be looking at \$750 to a billion annual losses under that program at some point in the next decade. (C2, p. 15).

5.5 Learning (Processes and dealing with disaster, flood plains, past events)

Institutions responding to emergency in Canada have existed for over 100 years and there has been much learning. Many do very well at planning. Many governance measures have reduced the number of events and through proper land use management and building codes the number and severity of events. Building codes are a key component of the learning process, however, the setting of them is a political negotiation which takes time and patience. Technically provinces are in charge of building codes, but in reality often national standards are adopted. Municipalities are able to influence through by-laws and procurement standards. However, the public often doesn't understand the science behind 1/100 events and implications of moving to a standard of 1/20 etc.

Municipalities are very stressed because of challenges relating to human resources and financial resources. There has been a reduction in education and training provided by the federal government with the closure of the federal emergency management college as well as the funding for local municipal government and emergency planners to attend this college and be trained. This institution had also provided a forum for networking of local emergency planners. Municipalities also have legal liability in relation to issues such as flood, as soon as they know there is a risk. This becomes a disincentive for municipalities to pursue doing risk analysis around climate events.

There is concern that learning does not occur after flood events. The following floods occurred, reports were prepared and filed with government, and no action taken:

1995 Southern Alberta

2004 Calgary and Lethbridge flood

2005 For MacMurray, Peace River and Edmonton south

In one case, Medicine Hat, after the 1995 flood, the city moved people out of flood zones and build a park and golf course.

In the mid-1990s the federal government was flood plain mapping and did have a program to move people out of flood plains with financial contributions from the federal government, however, that program was disbanded by federal government cutbacks after 1995. A common comment was that an emergency event crystalizes and draws attention to planning and response, but as time passes, this fades. The federal government has just issued RFPs for flood plain mapping again after the High River flood.

Interviewees were well aware that the climate was changing. However, it was unclear from interviews, especially local governance interviews respecting specific emergency plans, that climate change science was being incorporated into planning. Sometimes, responses were very specific from emergency personnel. Plans were in place for flood, or heat waves etc. Because of this they felt appropriate plans were in place.

Literature from other parts of the world indicated that the community resilience model of planning for disasters was the most appropriate approach as it resulted in the most reduction in disaster loss. However, instead of this model the critical incident command response model was employed. This model doesn't allow for public participation (a component of social learning) and in fact conflicts with it. In critical incident response, one department (e.g. fire or police) become the lead agency for a disaster and hierarchically

are in charge of response. The community resilience model embraces partnership and public participation.

There has been, and still is a significant federal institutional presence in climate and climate change research. Much of this occurs through Natural Resources Canada. However, there was concern expressed over closures of weather stations, loss of weather and environmental data, the creations of data gaps, inability to obtain good information, impacts of the downsized federal government in relation to agriculture, environment, and the loss of engineering capacity.

1. Emergency planning has been part of the institutional landscape in Canada for over 100 years. Much has been learned:

For more than 100 years certainly through the 1950s in a very formal way we have had very clearly delineated emergency response, regulations where every province in Canada requires every community in their province to have a documented plan, here is the mayor's job, here is fire chief's job, here is what will happen when an emergency is declared whatever the emergency. That process has been in place for more than 50 years and I think we are very good at responding. . (12. C9; p. 4).

2. Many institutions do very well at planning:

Well I would say SaskPower, SaskEnergy, SaskTel all have their own respective emergency preparedness plans and all do a very credible job, very credible.

IV And then our municipalities it is the number on the wall and sometimes

R Railways do a credible job, pipelines do a credible job.

IV Even if they don't have back-up emergency power.

R Yes. Do you remember YK2? Everybody now sits and says what the hell did we spent all that money for and blah, blah. (04. S7; p. 11).

3. Municipalities are very stressed, as they are currently in the headlights for being on the hook for flood liability. Many interviewees expressed concern over the loss of the federal emergency management college:

IV There used to be in Ontario, I think it was Ottawa, a national institute on disaster as well but that closed.

R The federal emergency at one time was called the emergency preparedness college and then about five or six years ago and maybe even longer they renamed it the emergency management college and it basically doesn't offer anything now. It is just about closed. It is doing some CBRN, chemical/ biological /radiological and nuclear. How it was funded initially the federal government paid everything. They paid your transportation to Ottawa. It used to be out in Arnprior which is west of Ottawa, they paid your travel, they paid your meals, and they provided the course free of charge and generally it was a one week course. It was a training course as opposed to education. You know some of the essentials in emergency management, how to run an emergency operations center, how to create an emergency plan, stuff on exercises

and so on. Excellent courses, excellent opportunity to meet with your peers from across Canada and I was probably there about three or four times because I started in the disaster health side and at one time Health Canada did the same they ran courses onsite

IV So do you think it has left a real gap the closing of that Ontario institute?

R I think so because there are a lot of people particularly at a municipal level that have been given a responsibility for emergency management. You might be a deputy fire chief, it might be the public works supervisor, and they are in their 50s or 60s and they are not going to enrol in NAIT or Brandon who has an excellent program or Royal Roads or York or whatever now in their career whether fire chief or public works supervisor but they do need to know how to do emergency management and that week at the federal college motivated them and gave them contacts, they learned how other people had done it and they went back feeling I have a grasp on what has to be done and I understand the role of the provincial government, the federal government and I understand the role of non-government organizations and industry so now I feel much more empowered and much more capable of handling emergency management in my municipality and we are talking the little places, not the city of Regina and city of Saskatoon, we are talking small communities, Swift Current, they have their emergency manager in our program as a student and that is because she is young enough, keen enough and interested enough to get an education in emergency management but she could have easily been a 55-60 year old. They are hoping to retire in the not too distant future but they still have a job to do. The college gave them that grounding, that preparation. They all went home motivated. The very first time I got to the college was the middle of winter and when it was out at Arnprior. It was an old air force base and we were all in dorms and because the thing had been closed over Christmas the pipes had frozen so there is no water the first day in our dorms and you know you sort of think what sort of a place I have got to. I mean I was living in Edmonton, we were quite a modern city and I get to this place where there is no water, you know and we are tracking across to another building to have showers, but that was a small inconvenience compared with what I left there with on the Friday afternoon. So it was the camaraderies, it was the sharing, getting to know the instructors, there used to be at least three courses going on with 40-45 people in each class and I was there doing disaster health that first time but I got to meet the people who were doing communications over to an emergency operations center work. It was an incredible set up. It was hard to leave the lounge some nights and go to bed mainly because you had course work and you had studying to do for next morning. The discussions and the learning from each other which we all know is the best way to learn now.

IV So when you said there were three courses, you mean every week they had about three courses going on so about 120 people.

R Yes they did. They would have a course and then there would be a break for a week and then they would start again and most of the instructors were on contract.

There were a few permanent instructors at the college but they brought in contract instructors during the week so again there was exposure to people from across Canada

IV Right with real experience.

R Yes right and invaluable and I guess if the federal government because this started back in the 70s and eventually the kid grows up and I guess they are thinking that maybe provinces and municipalities should have the resources in 2013 to be able to handle this themselves and certainly some do no doubt. You know Alberta does very well, Ontario does very well and BC incredibly well, Saskatchewan doesn't have a lot. (10. A1; p. 1-3).

3. Although some learning within the disaster response funding program of the federal government in conjunction with the provincial governments' was pointed out, the general consensus was that after each disaster (mostly flood) a report was prepared and the report was eventually shelved and none of its contents implemented. A new report was to be prepared based on the 2013 flood (CM).

IV Yes I think I have seen it. Is it confusing with all of these different committees and boards and tables?

R Yes it is and sometimes you begin to think and I guess it is not fair in a way but you often think well the federal government sets up another committee who go over the same old ground as we went over ten years ago or 20 years ago and you wonder when a decision will be made. A good example and it is not just the federal government, provincial government as well, after the 1995 southern Alberta flooding a committee was put in place to look at mitigation and make sure this doesn't happen again. My boss, the executive director for AMA at the time was on the committee and another manager and then eventually I was on the committee with him and we finalized the report probably about 1998 and it was submitted to the deputy minister and the minister and that was it. We heard nothing more about it. In the meantime there is flooding in Calgary and Lethbridge and 2004, there was major flooding in central Alberta, the city of Edmonton, there was flooding up north and quite often there is in MacMurray and in the Peace River area and then again the 2005 flood which actually was from Edmonton south. There wasn't much of the province left that didn't have flooding. Meantime up north in Fort MacMurray is having forest fires but 2005 flooding occurred and the old report was pulled out, they established a new committee later that year. They worked on a report and it was submitted probably about two or three years ago and now they have got another committee. So you start to get a little why bother attitude. Very few if any of the recommendations well none of the recommendations from the 1995 report nothing was ever done with them and part of it was saying let's move people out of the flood zones., turn those areas into parks and golf courses, parks preferably and get people out of the flood zone and we knew the communities with the flooding, flood plains, you know nothing new there. The 2005 committee basically made the same recommendations, different group of people, looked at what had been in 2005, did the research, there was more

information on climate change, more history on flooding in Alberta to back up the recommendations. So now the report has been dragged out again and a new committee.

IV They are doing a new committee now with what happened this year, right, with the 2013 situation?

R That is right. (10. A1; p. 9-10).

4. In one case, that of Medicine Hat, people were successfully moved out of the flood plain and a golf course built. It wasn't clear that this would occur in respect of the 2013 High River flood:

So a lot of the development already taken place and it was in a flood plain and there was no funding to move those people and a good example is 1995 southern Alberta flooding which was Canada's worst natural disaster at the time. In downtown Medicine Hat there were older homes along the river and in the area that was always referred to as the flats and those homes were flooded and badly damaged. The people that lived there were generally elderly and often widows and dependent on their Canada pension and no other income really because these were the women who stayed home, they didn't go out to work. They stayed home and looked after the house and we didn't want them to rebuild, the money would have been there under the DFAA to help restore the home, like new drywall and whatever was needed windows, new furnace and hot water heaters and so, but we really didn't want to rebuild in the flats again because we were just setting them up for the next flood but there was no money to relocate. The cost of the property, the home was damaged so it wasn't worth very much, the land wasn't worth very much so the owner didn't have the dollars to move to a safer, less hazardous part of Medicine Hat and there was no money for mitigation in those days in the DFAA so how do you work around that. In the end there was a compromise that the value of the land was the equity that the homeowner had and in some cases it was only \$10,000. In 1995 there wasn't a lot of money for land particularly in that area. So then the province and the municipality worked out a deal to try and relocate these people but some of them didn't want to go. They had lived there all their life, they had grown up there, their kids had grown up there, 80 year olds just didn't want to move to a new community and they knew everybody around. The little store at the end of their road knew the stuff their clients wanted, the groceries they wanted, the brand of coffee or tea they liked, so you are moving these people to a whole new environment. It did happen eventually and there was a lot of heartache and it took a lot of time to get them all relocated but in the end it occurred and they turned the land into parks and golf courses and so on. Now it is expensive if a golf course gets flooded but it is not nearly as expensive as 100 or 200 homes.

IV So is the federal, the DFAA is that based on that case study or the Medicine Hat event?

R Well it took years. After that there was a federal/provincial committee that met, well it didn't meet in the 90s, but they got it going in about 2000 working and trying to get mitigation money as part of DFAA. DFAA stands for the disaster financial assistance agreements and it is a federal program. You probably can get the document; well I know you can get the document online at Public Safety Canada.

IV I have looked at that but I guess my question to you is when the Medicine Hat situation occurred and governments federally and provincially well we shouldn't have these people rebuild on the flood plains so they had this process of paying out equity to get these people to move among other things, did they amend the DFAA after that learning experience?

R Yes there were changes made in about 2004-2005. It took a while to get an agreement that if a province had spent \$100 million on a recovery program that a certain percentage could be used for mitigation but it is a small percentage, I think it is about 10 or 13%. It is a start. Now the Medicine Hat situation that I described isn't the only one across Canada. There are similar situations in the Maritimes, Ontario and I believe in Saskatchewan and BC but basically there was enough pressure from the senior officials. There is a committee called the senior officials responsible for emergency management, SOREM, and they meet a couple of times a year with the federal government to basically discuss emergency management, policies to move things forward, and they brought it to the table just about every year it was on the agenda. You know we have got to start thinking mitigation, not just thinking about but putting some money in mitigation and it is a key part, a key phase of emergency management but still has a long way to go.

IV Okay so the next question then is if mitigation is so problematic and we are already revisiting this again with the High River situation, we didn't learn from all of that, what about climate change and actually these events occurring more often?

R Well they are all tied in and there is a strong movement across Canada on resilience which incorporates a lot of the principles and concepts of mitigation and you know the federal government is aware of it; there are always debates on is it really climate change or just part of a cycle and we will get over it. There are a lot of agencies across Canada, the Canadian Risk and Hazard Network, is one area that there is a push and resilience in mitigation and in fact we have got committees that are working on that and Laura Pearce who is with UBC and Royal Rhodes, professor out there chairs a committee on resilience. It is part of the round table on disaster risk reduction and you see that is another program that if the federal government responded to all the discussions and all the requests and issues and established a round table on disaster risk reduction which is similar to the United Nations. They have a similar setup and Canada was a partner at the table there. So then back in Canada the provinces and the CRH Net and then various universities academic lobbied the federal government saying we have to move on this. So there was the first round table probably about four years ago and the federal government brought a lot of people together and put new initiatives including a lot of committees and including the resilience committee that Laurie Pearce works, our chair, and we seem to be doing very well

and the next one is coming up in Saskatoon in November. It is tied in with the CRH Net symposium and it seems we are getting a sense that although the federal government supports it and you know there were a lot of people there and people to lead the different sessions, but because of funding they are backing away somewhat. We have nothing concrete on that just that it is harder to get them to come to the table. We want a representative from the federal government on the CRH Net board. She does come but very limited in what she can promise or what she can tell us on what is happening or not happening. So you might want to check that if you go to the CRHNet.ca you should be able to find the website. (10. A1; p. 7-9).

5. Flood plain mapping had occurred in the past, but no measures were taken to move people out. After the 2013 flood the federal government issued another call for flood plain mapping.

R Right culture but how does that culture play out because they will penalize a politician for doing the right thing by voting him out of office. You call it culture and it is but we are dealing with the same thing. You commented during our discussion that Alberta is sort of on the fly doing policy things on how to manage floods. Okay so I am going to jump over to flood. Do you know that in 1999ish that one the national government, the federal government, was looking into flood program review overall. At that same time Alberta and it was myself that participated in this we did a flood management plan for the province so that document froze. In 2005 a MLA committee was appointed to take a look at that. Their main source of information was our work that we did back in about 1999 in terms of that and plus they updated it with current thinking and examples that have been happening in other places but predominantly it came up with the same kinds of things. Again it didn't get fully implemented because not all of the things were maybe the right thing at that time and all that, but the main reason those things don't place is because the press and the opposition would so confuse them and go after the 10% on them and then therefore the politician who is thinking of implementing them gets penalized in the polls for doing something that is the right thing but it is unpopular to some individuals who then blow it out as to a total problem and your examples of what things get paid for, what limits get paid for them, how often do they get paid for them, is it this last time that we are getting paid for them, all of those things are very, very, very hard political decisions. Politicians don't get rewarded for doing hard decisions instead they get penalized for them (A4; p. 12)

6. But this is another round of flood plain mapping. Previously flood plain mapping has been undertaken and then disbanded when no longer a political priority.

Well there was a flood damage reduction program back in the late 70s or early 80s in which they mapped the flood risk zones in every community in Canada. (18. C1 part I & II; p. 4).

R The last time those conditions were really in place were under the federal flood damage reduction program which the last of the funding went out I think sometime in the mid-90s for that. So that was a program through Environment Canada and the way that program worked is that provinces and territories cost shared flood plain mapping with the federal government and once those flood plains were designated, so through this kind of combined effort between federal and provincial territorial governments, then there was a condition that provinces and territories were not to build in the flood plain itself. So up to the 1 in 100 year level I believe and also there was work done with the Canadian Mortgage and Housing Corporation to try and ensure that you couldn't get mortgage insurance for new developments once a flood plain had been designated but all of that got cut in the early 90s and the last of the admissions sort of played out by the mid-1990s. So to the best of my knowledge there hasn't been any of those federally imposed or federally negotiated and researched on land planning since then.

IV And why is that?

R That is a good question and an answer we hear frequently is that it is really primarily a provincial territorial jurisdiction. There is not any legislative authority for the federal government to really engage on land use planning that comes ultimately down to municipal planners for the most part. So that is the primary reason we have heard at least in the justification for why that program was cancelled in the early 90s.

IV So was there a court case or something?

R No not to my knowledge. I believe it was program reviewed so as part of reducing the deficit in the early 90s and they were looking for places to cut and at that point I can't remember if it was 80 or 90% those figures are available on Environment Canada's website but some high percentage of the Canadian population was at that point covered by relatively up-to-date flood plain maps so it looked like a good area to cut because you already had 80-90% of the population covered and there would be an marginal return on investment for the rest of the 10% of the country because it is a vast area and not a lot of people living there. So I think it just looked like a place that potentially could be cut.

IV So is there any plans to do anything in that area again or is it completely off the radar?

R There is a media report that just came so it is in the public domain that an RFP has been put out by Public Safety Canada to examine the state of flood plain mapping in Canada. So I can't remember if the media report was MacLean's or somebody else that has released that and so they accessed some information through accessed information and also through discussions with the Institute for Catastrophic Loss Reduction in the Insurance Bureau of Canada to have some specifics on that RFP (C2, pp2-3)..

Recent events facilitate planning, but as time passes, momentum is lost.

In advance, in preparation it took less effort for us to convince them to prepare and it is your responsibility to prepare for and to respond when it happens far less convincing. Other areas of the province that hadn't been through it very recently we had to do what we did in 2010 and 2011 to prepare them and there was no acknowledgment, no understanding, no appreciation and so what we found is our direction with them when it started to happen was the light bulbs started going on above their head, oh my goodness, this means this and the confusion and some cases the blame, the finger pointing and what have you that they went through was similar to what we went through before elsewhere. They didn't have the same issues where they had been through it before and it is because it was fresh in their minds and they had been through all the stages before of acknowledging responsibility, awareness and understanding and willingness, etc.

IV We found similar experience in relation to drought in the southwest of the province. Communities are quite ready for the drought always, always it doesn't matter what happens, but in the north they have no idea.

R1 They can't appreciate it.

R2 You know in the Qu'Appelle Valley the one chain of lakes in 2011 and 2013 were well organized but that is not to say that they didn't have some that had to be re-convince that there was going to be something in 2013 but clearly that is an example we would use of people working together, recognizing the threat and doing something about it. (08. S4; p. 3).

Many governance measures have reduced the number of events such as proper land use management, construction of buildings etc. BC has some interesting programs and initiatives.

What adaptation and in the jargon of emergency management, what prevention and mitigation could have done or what in the climate change community we call adaptation could have done, is reduce the need to respond. We have extreme rate to answer if they didn't overwhelm the city because we have proper land use management, construction of buildings, a whole series of adaptation options, we could have learned to cope with climate extremes and other extremes that occur even if they are happening at a larger scale and more frequently we simply wouldn't have had a disaster, we would have had just a very bad rainy day just like me lamenting about getting caught in the rain last night. It wasn't much fun but it certainly wasn't a disaster for me if you know how to cope with these things. I had my umbrella and my raincoat and my boots when I needed them. I got wet but I am okay. (12. C9; p. 4).

Well I mean I think notions around you know conserving water certainly the public's outreach you know turn off your taps and those sorts of things are always good that whole kind of a campaign could and must continue, probably needs a little more emphasis on the implications if we don't. You know in a period of drought if we were able to put that kind of a message together. When you have water supply and we manage water supply I mean there is ground water but then there is surface water is managed often for water supply to dams and reservoirs which provide water supply

but they can also manage the water too you know. Again in how you convey that water to the supply that water there could be advantages for managing storm water. Also I think another practice that I am starting to see is using like for storm water well of course always using nature the lay of the land to manage your storm water is always good, take advantage of those, gullies and that don't develop in those gullies where you are going to have storm water running through it all the time as an example, I am also seeing some plans around using our roads. You know [words] conveyance for water. So they get designed a little differently so that they can actually serve as conveying surface water to avoid again collection and flooding. They will design their roads in such a way that they could be collectors and conveyors of water which again can reduce flooding quite a bit. Those are a couple ideas just off of the top of my head. (16. C5; p. 13).

I will tell you Ag Canada has been terrific in a lot of very important ways. You know we have the Summerland Pacific Agricultural Research Centre or whatever it is called, the Summerland Research Station, so there are folks there who have been doing climate modelling, really ground breaking work doing detail scaled down climate models that they have shared with us very generously. It has helped develop an agricultural water demand model for predicting how much water is currently being used and how that much change under different kinds of climate conditions. It is a very, very detailed model. They have provided a lot of funding to help get farmers onto to better irrigation systems which has been very important. (19. C6; p. 4).

A little but not much and it is not nearly as properly done as it could be like for example you had Hurricane Hazel came through the Toronto area in the 1950s and killed some people and did a lot of major flooding and damage, you have got the conservation authority in Ontario, which was put in by the Conservative government, they just said we are not paying for anymore of this you know everybody off of the flood plain. It has worked reasonably well though it has taken a long time. On the other hand I go over to BC and I go on a ski trip and the newly built chalets there and I walk out onto the balcony and I see birch trees and their branches are level with my head and they are covered in silt which means they have been covered in a flood and it has been dam recently you know so obviously somebody else didn't learn. If you go out to the west you have issues with drought, well maybe it is due to climate change but we also know that the warmest period out there was back in the dust bowl and there were huge issues with drought and loss of land because at that point at least they went into areas like Palliser Triangle well perhaps they shouldn't have been there. Well at that point they learned and they moved back you know are we learning something, sometimes we learn and sometimes we don't and you know honestly in disaster emergency management, it is very flavour of the month. You know if there is a hurricane everyone learns from hurricanes and some work is done and everyone goes nuts about their supply chain and puts plans in but you know what the next terrorist event changes that and then the next event beyond that changes that and you know long term learnings yes but not as much as there should be and in the states of course they have had problems with flood insurance which is one of those

great ideas I think White was the guy that put it forward and it just came and bit them right back in the butt. (11. C8; p. 9).

So in discussion with some communities they have learned to deal with the water that is coming into their communities but they know whatever they do impacts down the road but they don't know what the mechanism is to actually deal with that or how do you deal with the water that you remove from your jurisdiction that is going to go down to the next jurisdiction. So if you look at the Manitoba and the Minot's of the world all looking at Saskatchewan but of course the interesting thing that I certainly realized is that if you look at Lake Winnipeg the Lake Winnipeg basin is basically the prairies. So it is kind of like a sink hole drawing all the water in sort of a south easterly fashion into Manitoba and so what we do impacts others. So that is where governance really becomes critical and how do people manage that and of course there has to be systems in place and an understanding of how that governance would work and what the mechanism is and of course now we have a lot of issues around drainage which is a very hot topic and producers are wanting to farm with their larger equipment corner to corner so what impact does that have in terms of the local climate in terms of wetlands and how that impacts those plant and animal biodiversity in that area and what role does the wetlands play in the whole adaptation to climate change. I see it as a potential tool for both flood management as well as reservoir potentially for drought years. (07. S5; p. 2).

Building codes and standards are a key component of the learning process. However, the setting of building codes is a political negotiation taking time and patience. Provinces are technically in charge of building codes, but municipalities are able to influence things through by-laws and procurement standards. The public doesn't understand the science behind 1/100 events and the implications of moving it to a 1/20 (DL)

The problem that I have with the federal government deciding they are going to do this is they want to standardize it. So right now there are different standards in each province because it is a provincial responsibility like in Saskatchewan for example they use a 1 in 500 standard, so one chance in 500 or .2% chance that anyone near flooding is the standard. So any new development has to be built upon the 1 in 500 flood line in Saskatchewan. The new ones are so they have got to go through community development or whatever that department is called so they will go and one of the requirements is that they will go to the Water Security Agency and it is what they call safe building elevation. Well the safe building elevation in Saskatchewan is 1 in 500 plus a half of a meter in elevation and so they all have to be above that or they won't let them proceed with development. However, the problem is the provincial government sets the rules, develops the tools but the actual control of development is at the local level. It is at the RM level or community level or the resort village level around lakes or whatever it might be. There was a big flood in Manitoba in 2011, Lake Manitoba and the Assiniboine River, so I got appointed to a task force to review the Government of Manitoba's response to the management of the 2011 flood

and so we spent a year meeting with everybody that was involved and holding open houses all around the province. In Manitoba their standard was different. It is the 1 in 100 flood or the flood of record. The higher the 1 in 100 flood record. Well then you get a flood like 2011 which is like a 1 in 400 flood or even higher around Lake Manitoba, is it reasonable to expect cottages to be built above the 1 in 400 level. So one of the things that we recommended was we didn't like the standard they used for two reasons. We said the 1 in 100 level was too low of a standard because when asking people around any lake or water body we would ask are you prepared to accept a 1% chance in any one year your house would be flooded. Yes no problem, but are you prepared to accept a 40% chance your house will be flooded before you pay off the mortgage well they were not. So we said we think the 1 in 100 is too low and we recommended moving to a 1 in 200 flood because we thought it was a good balance between the long term risk of flooding, which people don't understand or accept, and the uncertainties associated with estimating more rare floods or longer in term periods of floods because it is getting to be a bit of a stretch to extrapolate beyond recorded periods for these very rare events. So Manitoba had the 1 in 100 flood of record and we recommended the 1 in 200 and I think that was accepted. We had 137 recommendations and that was one of them but we also addressed this whole issue of flood plain zoning and development. So as I said before the provinces provide these tools for example they have flood risk maps which outline the risk of flooding and those are tools for controlling development but it is up to the community to use those tools to control development and they choose not to in many cases because they are not going to turn away development. So what they did in the case of Manitoba in the Red River Valley, the province basically took that control back and I can't remember what they call it now. There is some Act that they did it under and we recommended they do the same thing around Lake Manitoba because people were flooded there that shouldn't be flooded. They shouldn't have been built where they are. You see that all along the Qu'Appelle Lakes. Dave Jerand's cottage for example, right, they had four feet of water against their house in 2011 and it shouldn't have happened. I mean I sandbagged it the thing for him. So they stockpiled bags again this spring but didn't actually have to put them up. (18. C1 part I & II; p. 4).

There are some examples of how this is being handled. You know for example in Quebec they have a master specification for waste water control systems that says you should include a 10% climate change factor on top of other factors just a blanket sort of straight line wherever you are in Quebec add 10% to the design criteria to account for future climate and my understanding is the rationale behind that is we don't necessarily have enough evidence to know exactly how much to recommend but we do know we are going to see larger volumes and until we have more precise evidence then that is the best that we can do. So now we know when a municipality in Quebec issues a contract or a request for proposal that in their budgeting they are allowing for that extra 10%. So that is one way that is being done now. I don't know if that is sort of a specification being carried out in other jurisdictions besides Quebec. I don't think so from my understanding but at least it is a step in the direction towards ac-

counting for climate change to handle the larger water volumes from these more severe storms and that is what the engineers are doing. They have to design to handle extremes at least within the limits of cost and willingness to pay from the taxpayers. So you know it is a balance between requesting it and obviously the financial resources that are available. (16. C5; p. 2).

You may have heard of LEAD which is a building rating system and it is used primarily which has got good practices and a sustained building and all that but it is kind of a point system where you get different levels. You can get like a Gold LEAD or a Platinum LEAD and builders do that for marketing purposes or to attract tenants to the building saying hey we are a Gold's LEADS standards so we can border a good building and we are sustainable and we save power and all those kinds of things and that attracts tenants and that means that they can probably charge more money for rent for those buildings. So there are kind of the incentives side to this as well as the regulatory side and obviously construction in procurement I know that some municipalities were and we had Engineers Canada actually advocating for municipalities to start asking for this kind of accounts requirement change in your procurement. You can ask for it and it won't necessarily cost a whole lot more money. It is maybe just accounting for future climate and it is easier to do it now than it is you know trying to retrofit "oh gosh we are always repairing why can't we see the huge floods in Calgary and Toronto. I mean not to say that those are really freak events but perhaps some of the impacts if they were able to anticipate that or you know in previous time to be able to reduce the damage. I wouldn't say they would have eliminated it but you know those sorts of things so it is sort of be a little more proactive I think now and you have got certainly experiences. We are getting more and more of them in Canada about those extreme weather events and you can see what the devastation and the costs that are involved and you know do you want to exacerbate that by not doing anything later because these are only going to happen more often and you know that is certainly in the cards exactly when and where and exactly how much is of course we can't predict the future that way but we can certainly know that these kinds of things are going to happen and it is good practice to anticipate these and try and do your best to reduce. I mean you can never eliminate because you just couldn't afford it but at least you can reduce the damages so that when these things happen the disruption and the repair is minimized as much as possible. (16. C5; p. 3).

I mean one of the things that you have got to do with codes and standards is to present the evidence and you know they have been understood that there is a need for change. Codes and standards is a very slow moving process. I mean the national building code gets reviewed every five years and you know it is only beginning to start to take into account climate factors more and climate change. Perhaps by 2020 you may see more language that makes reference to that and it is a process that takes you know a number of years and there are a lot of technical committees. So there is a very technical and rigorous aspect to the process so don't get me wrong on that front it is just that one of the factors that is always going to be when they present these proposals is they have to go and consult with these proposals that they are going to get resistance from some that say "well this is going to cost more money, you know

or we can't do this", you know these sorts of arguments and that makes it you know when a code changes from the rigor and the logic under which it has changed has to be absolutely or pretty near bullet proof at least from what I can tell and you know if it is bullet proof then hey we will drag everyone kicking and screaming to change it but the other thing about codes and standards is that there are minimum standards. There are not maximum standards and they are kind of used as a legal basis for you know if there is a dispute about a construction project or whatever like did you follow the standards and the builder is going to say yes I did and the client may say you did not and then you have to prove. You know it is used as kind of a measuring stick. So codes are used not just for I guess guiding construction and design but they are also almost like a set of rules or the referee in the event of disputes and legal disputes and so therefore they serve a very important role because they hold the reference points and so it is an achievement when you do achieve a change in a code. Now codes are in the process of changing somewhat in that codes in the past have been very prescriptive, they will be very specific like you say the 1 in 100 and that sort of thing but the process is changing somewhat in that I know the building code is moving towards what they call objective based codes. So basically what is the outcome you are trying to achieve rather than saying well you know these are the minimums here and there? So as long as you know the proponent can demonstrate compliance with the codes and as long as they can demonstrate that their design meets the objectives set out in the building or whatever code it is then that requirement is satisfied. So it is a little more vague than I think but you know this is an evolving process. I am not intimately involved with it but from where I am sitting it still has got some time to work out with more and more good examples of how that is defined and how it is accepted and all that sort of thing. So it is sort of getting that process in place so that it is a viable one and accepted one for the long term and I think they are kind of in the middle of that but again I am a little bit removed from that so that is where it is from where I am sitting. (16. C5; p. 4).

So things like again there is a provincial law so you can go into setting standards at a provincial level like I mentioned the RND like in Quebec. You know that is absolutely possible because those kinds of systems are for the most part are funded by provincial and municipal funding. The feds have had their occasional infrastructure programs coming in and there is going to be a build infrastructure program kicking in the next fiscal year so they are getting ready for that you know that the government announced and what the ten year fund build, Can Fund it is called so on that one for example there is an opportunity to bring in and we are having some informal discussion with some folks there about putting in some things around future climate and that Build Canada like you know do people need to consider climate change before they get a funding approval for example and there are mechanisms that you could use to make sure people do consider climate change because if you don't consider it or demonstrate that then you know you are not going to get your money. I mean that is a pretty good stick. You don't need a law for that one or if it is a requirement and you have got several consulting companies bidding for a design job and you say look I want to have a sustainable infrastructure here over its lifetime, show me that how

your conceptual design will achieve that and maybe I will give you ten more points in your evaluation and that might make the difference between getting the job and not getting the job. So that to me is also another powerful mechanism in the whole procurement process because people are consulting for them to work and if they don't show that they are doing that then they have the danger of not getting that job and that to me is it right there. So that is part of it and I don't know I guess just having another aspect of all this is of course the awareness and the capacity of staff shall we say to be thinking about it and to be asking for it. So you know municipal staff and of course the councillors being aware because they make the final votes on things that they are made aware that there is a need to consider it, you know the risks from climate, and that these are factored into our plan here to procure this infrastructure and here is the cost and the councillor has his information to make his decision. (16. C5; p. 6).

There was disagreement amongst people interviewed if climate change science was incorporated into emergency management.

Do you see any kind of ability there to influence local developments and municipal zoning whether people are going to build back into the flood zone in High River that they were on?

R Yes that is the big question that has come out of this. I think there are a couple of aspects to it. In reality the communities are really built like the infrastructure and buildings that are in the flood plains are there already and whether we want to go ahead and say well you can't build your house or you can't develop land in the flood plain going forward I think that is a question that we will be looking at and I don't know what that answer is. So what I am saying is that I don't know that you could have really prepared for what came. The floods that came we have never experienced anything remotely close to them. We had a very large flood in Calgary in 2005 which was considered one of the largest and this one was five times that size just in Calgary alone and we have never had anything in all the cities and all of this area inundated that quickly before. Like I said that is a very live question - what now? We are still very much just tying up the response phase and into the recovery phase and we will be looking at those questions as soon as we have some resources to do so. (02. A2.; p. 9).

I am not a climate specialist, climatologist or meteorologist I am more of a lay person agrologist so I think I find it interesting but I can't say if there is sufficient information or not. Having said that just regurgitating what other people have said is that some areas of climate change are going to be easier to determine than others and I think temperature is one but will be difficult is as I understand it moisture. I found Dave Sauchyn's study on looking at tree rings really quite fascinating and at the same time a little daunting because thinking about you know if you had ten years of drought what would that mean, how would that impact us and I don't know if anybody has ever looked at that. What would that mean like for Saskatchewan 2014-2024 we are to have some severe droughts, what is the plan, how would we deal with that, how would we ensure that the water availability that we have is prioritized, how

do we ensure food security, how do we ensure industry? So I think though at the same time we need to look at greater legalization of our assets. Maybe we also need to be looking at how we can be more of closed looped operations, organizations, communities. You know I think about Lumsden and their little flush toilets and how that helped a developer to develop a property because of initiating some of the residents to switch to a low flush toilet. (07. S5; p. 7).

Well the National Platform for Disaster Risk Reduction is discussing it. ORIMS alludes to it and RIMS in their magazine talks about it like there are articles on it. GTIME one of our first exercises was a heat alert and we talked about climate change and how you would be getting more heat alerts.

IV Did you actually talk about the science of climate change and how uncertain the science was?

R Not in detail basically the level was we have got potential climate change coming in and this could mean more heat alerts, so we are going to have an exercise on heat alerts and next year the actual exercise was well we have got terrorism issues, so this next exercise is going to be a nerve gas attack to blind the social media because in all of these exercises you keep twitching them up each year to make them more interesting. And the first one again, the heat alerts and they are things that heat does to computer systems and so on that people really need to discuss and especially if you lose water pressure and so on. Then you go into the next one and there is a basic commonality in all of your business continuity responses but there are certain things you use the exercise to play up. In ORIMS 3 and I said in national platform they have explicitly talked about climate and with the ICLR, the insurance industry and many of its writings have been concerned about climate change. Do you know what a re-insurer is well re-insurers are very heavily concerned about climate change and many of the presentations the ICLR will talk about climate change and I think they have also built some of their lobbying about building codes and so on it takes into account severe weather which may be affected by climate change. Now as far as if you want to get into a discussion of the science behind climate change, the science is good, the science is bad, the science is ugly, not that much about it but I do know that on the research side of the ICLR there is Gordon McBean and he is fairly big on the science side of that and he was also on the ICLR and was probably involved with the national platform but if you want to discuss whether the IPCCs latest step back in terms of COP sensitivity now I think it is one degree rather than two or three. Now that is not discussed. I personally discuss it and am personally interested in it like the aspects of the science and the bad aspects of the science, but that is my personal involvement mainly because I have a little skin in the game with articles that I have written and yes I managed to tick off both sides on that because I don't like crappy science. (11. C8; p. 4).

Providing appropriate information to understand the risk is very hard and certainly that is why I have put so much time into the intergovernmental panel on climate change because that is trying to come up with a rigorous scientific approach to doing all of that but it is difficult. How do you communicate this, how do you communicate

that the water damage from flooding in south Alberta, it would be inappropriate to describe that event as climate change but that is the kind of thing that climate change says will happen more often. So that is a nuance thing that is more straight forward to say in the science and to discuss when you have got time but in a short clip on the media how do you describe that and communicate that because some audiences that have different expectations and understandings. It is hard. (12. C9; p. 8).

It is not that it is not happening at least that is what my take is on it. It is happening and in fact in the prairies it is likely to happen more often than in the past because of climate change. As it gets warmer up from the south to the north everything is getting warmer than it has in the past and so is southern Alberta. Southern Alberta is also experiencing an increase in temperature and I think a problem they have had is with water availability in places like Cochrane, you get the Lethbridge, Medicine Hat area there are a lot of areas there that have traditionally relied on irrigation because they didn't have enough natural moisture. The population of that area is also increasing so the risk is not going away. I can't speak as to why the federal government has not put it on the table because I am not involved in that decision process but I can relay to you that in my understanding and my take it continues to be an issue of concern and problem you know when it occurs, knowing the federal government, it will make its decision and allocate funds at that time. So my take is that while it is not on the list it will be when it happens. (13. C7; p. 4).

Well that is part of it right. You know in the prairies here there are extremes and my interpretation of what climate change is in the prairies there is greater variability, greater extremes. In the north maybe a little bit different. On the east and west coast again very different. Rising shorelines is a big topic on the coast so how do we cope with increased variability. So the mining sector would say okay what our risk to increased variability is. Then they have pot of money were they put out calls for proposals and you have all probably seen that right? (14. S3; p. 2).

Well I think what is developing that is new in terms of the flood situation and climate change is it is becoming apparent that we are getting an increased frequency of severe precipitation events as evidenced in 2010 and 2011 which is consistent with what researchers have been saying about the impacts of climate change that there is increased frequency and intensity of precipitation events. What we noticed and observed in 2010 was the persistence of precipitation over a long period from April to September and then in 2011 we saw very extreme precipitation events that occurred over large areas. So those were observations but the events that have been created by precipitation in the last ten years have now become the basis for design events. Historically we have used snowmelt, runoff, floods as the design for determining what the 1 in 50, 1 in 100 or larger the end might be to design water structures. Now we are looking at the precipitation record and looking at spring and summer precipitation events and their probability because they now appear to be more dominant and become the design event. (15. S2; p. 1).

So we are still faced with a lot of uncertainty as to what the ultimate impact of water supply is going to be. We know that climate change is generating more average precipitation. Average precipitation is going to go up even in Saskatchewan here but what they are saying is we are still going to get these periods of drought, longer duration drought, but then we are going to have these other periods of more intense, more extreme flooding. So what does this do to our overall water supply? So we are still sitting with a lot of uncertainty on how we manage the prospect of drought and the implications of climate change to drought. So we don't have anything really concrete. You know the work was done in 2005 on the South Saskatchewan when the U of S came up with a 13% reduction in the long term average annual reduction in flow. (15. S2; p, 10).

However, interviewees did express that climate change wasn't the cause of stress on water availability, increasing demand was.

Yes the water availability study. We are trying to get a handle on two things. One is the current use and then some characterisation of the availability of supply which would be the statistical distribution/availability of flow. You know the BBM, lower quartile, frequency of no flow kinds of things and that isn't a problem that we have had to face very much in Saskatchewan. In the southwest where development took place first in the province and very rapidly and as they developed irrigations they became more allocated so people down there on average suffer shortages from 30% to 50% of the years with their irrigation. So they are over allocated but they live with that and they still find water to irrigate alfalfa you know six years out of ten is still pretty good. So they manage and we don't allocate any more water, it is what it is down there and with climate change it could get worse. This past of couple years on the Qu'Appelle system they have been faced with the prospect of these solution potash mines which is a significant amount of water and allocating for them and of course they don't want disruption in their production. They want the ability to have continuous production and that is kind of a new thing that we have to bridge in looking at new water allocation policies. We can't guarantee water so everybody that gets an allocation of water has to have an understanding because of the nature of our climate you are going to have a time when there is no water. I mean that is a fact. On the Qu'Appelle system Lake Diefenbaker may put us in a different perspective but many of our systems you could have times when there may just not be any water and maybe even if we get water from Lake Diefenbaker curb their supply because of other priority uses. So then the future for us is what is the potential frequency of that kind of variable situation or no flow situation and what does that mean for us when we allocate water. So that is kind of the new challenge that we face and making people understand. You know there is a perception out there right now based on historical record we could say we can supply all the needs down the Qu'Appelle from Lake Diefenbaker with the canal that we have got, so there is essentially no change to your water. You know Katepwa Lake and Echo Lake they won't be any different but making people understand that there is going to be a natural situation arising and you know you don't have enough water and it is unrealistic for you to think that you are always going to have water available. (15. S2; p, 5).

It is apparent that learning about identifying disasters, and determining how to quantify and track them is an issue:

I mean if you were asked to put a value on the damage caused by a drought how would you go about doing that? Well it is an interesting question and I haven't done that question so I don't know that one. I am an economist, that is my training, and in the profession there is a difference between direct and indirect costs. The wild fire in Slave Lake we can count the homes that were destroyed and the government center that was destroyed, the bridges and such destroyed and had to be rebuilt, you can count that up very clearly so that is direct damage. We had a lot of people who were out of work for several months what value do you put on that so that is indirect and that is usually not counted. So a drought how would you count the crops that might have been or whatever. Those are fascinating questions and there is a whole literature on managing databases and the International Council for Science over in Paris has a series of publications on how to best keep disaster databases and they have a working panel that includes the three big databases, the International Red Cross, the Munich Reinsurance Company and the Swiss Insurance Company and the three of them meet with a group of interested government and other stakeholders and they have been meeting for the last five years on the quality of disaster data, how to improve international databases. I am not certain how formal the Public Safety Canada effort has been but there are some of these global efforts trying to get good data. If you choose one part of the database and I will try to be careful in my language here, but anyway to some extent has been misused by the climate change community using this Canadian government database. You will find that the number of disasters in there increases every decade and increases very significantly every decade. We have almost no events in the period from 1900 to 1910 but we have more between 1910 and 1920 and even more and I am not convinced that is climate change although some people have suggested that it is and I think that is the way the data are collected and put into the database. We don't have as many people to remember what happened in 1910s. (12. C9; p. 7).

Several experts agreed that the community resilience model was the best model of planning for disasters, but Canada was using the incident command response model instead.

I would say that the community resilience based approach is where we are seeing the most actual reductions in disaster losses so that seems to be the trick. There was a big assessment done in the mid-90s something called the Second Assessment of Natural Hazards in the United States that looked at basically 15 years of implementation of that four pillars approach and really found that there was an under investment in disaster mitigation and in trying to build community level resilience and so first of all there was a huge inter-disciplinary study that was conducted in the US and Dennis Malady is the lead author that pulled it all together but basically their findings really pointed towards the importance of this community resilience based approach and the Hyogo Framework for Action which was signed in 2005 that I mentioned established

under the UN ISDR really again points towards the importance of these community resilience based approaches and it is only since communities even in poor, high risk areas like Bangladesh started to implement these approaches that they actually have netted the benefits of reduced disaster losses. So that really seems to be the trick. (09. C2; 14).

This model doesn't allow for public participation, and actually conflicts with it.

The response to terrorism is also something emergency planners respond to which is problematic as the paradigm for responding to a natural disaster (providing open public information) and responding to terrorism (privacy, security, and secrecy being paramount) are very different.

The government has learned to allow crop insurance to perform its task and not offer cash payments for losses.

What I was asking was a person who relies on precipitation gets a drought because of Mother Nature and yes we may be going into a climate change or a changing world and all that kind of stuff, but they get it because of what happens to water that comes from the air. An irrigator can have a drought because of what comes from the air and generally they can manage through it because there is an administrative system of how they get water. If that administrative fails whether it is a legal system that fails or whether it is a mechanical system, a gate won't open, or a channel fails, then the irrigator has a shortage of moisture but for a mechanical or legal reason not Mother Nature. Do you separate those two things out? They are handled absolutely differently. (17. A4; p. 6).

So up to the 1 in 100 year level I believe and also there was work done with the Canadian Mortgage and Housing Corporation to try and ensure that you couldn't get mortgage insurance for new developments once a flood plain had been designated but all of that got cut in the early 90s and the last of the admissions sort of played out by the mid-1990s. So to the best of my knowledge there hasn't been any of those federally imposed or federally negotiated and researched on land planning since then. (09. C2; p. 2).

There are barriers to learning. At the municipal level, acknowledging flood risk creates a liability if nothing is done to mitigate the issue; after initial response of emergency personnel there is a loss of attention.

So we are trying to work essentially the realtors and the insurance bureau that is taking a lot of the leadership on this but I haven't gotten involved directly in insurance issues with someone who has been flooded. The end that I get involved in more is one where a municipality will say "well we are concerned about our liability if we do a flood risk assessment because if we are told that something is at risk and we don't do anything about it, then we will be liable for fixing it if something bad happens". So what I am trying to do is work with this larger team to get that kind of liability analysis done, disincentives for people to do risk analysis. (19. C6; p. 7).

Like contingency or maybe a fund you know what I mean that would enable the response to actually last a long time like in a sense the initial response of the day or two may be pretty effective but after that I think the resources start to dissipate.

IV I see what you are saying and then you just kind of leave it for people and their insurance whether they have it or not to work it out.

R That is kind of what my perception of it is and I think if there is a drastically different situation they should do a better job of communicating it. My perception of it is you know we can generally mobilize police and emergency people pretty rapidly and you know we can get emergency things going on but when then when it comes time to sort of repairing the damage all of that kind of mobilization disappears pretty rapidly. (20. C10; p.5).

IV I think I have covered a lot of my questions. When you do your review do you have any idea how you are going to go about doing the review like what process methodology you might work?

R I am not sure. I mean there have been calls for an independent review so outside of us which is what we did for Slave Lake. We hired an outside consulting firm to take an off scene independent unbiased view and right now I can't really say. We know that we need to do it. How we are going about doing that we haven't had an opportunity to think about it yet.

IV Okay but that would be with respect to what we are calling the High River floods even though it is bigger than that but with respect to your legislation and your regulations, how do you see going about that?

R Well originally we had a plan and I think that plan has really gone out the window in the fact that we hadn't identified anything in particular actually very small issues like more housekeeping stuff. So our plan with that was we were going to talk with our stakeholders you know the municipalities, first responders, we were going to take with some of the partners that we respond with you know the people in our operations centres, the Red Cross, non-governmental agencies and just getting their perspectives on what works and what needs to be updated. We hadn't identified any major issues with our act. I think now that plan is probably going to change radically so perhaps tying it into the larger view of the incident, I don't know like I say. It was sort of half way up the food chain when the southern Alberta floods hit and how we want to proceed with that now probably will change. It is another one of these live questions that we will need to get to pretty soon. (23. A6; p. 10).

R It wouldn't help them much because there will be no yield to compare it to and that is another plus for irrigation. Sorry to be a salesman here but irrigation is a great drought proofer, great crop insurance because we can buy fertilizer, use good seed, but if we don't have water nothing is going to grow and produce. It is huge drought proofer for roughly a million and a half acres. Actually if you include private irrigation I think there is about one and three quarter million acres of irrigation in the province.

IV Yes and Saskatchewan still has the potential to build some irrigation.

R Yes if the government there decided that is where they would invest their money you know it would be very good for agricultural in Saskatchewan. They would be able to diversify more. You know Saskatchewan has done very well by importing a breeder out of the United States who bred a variety of lentils that now occupies two million acres in Saskatchewan and they feed the world with lentils. So they have made their own adaptation using the crop that does quite well in dry and heat and is valued around the world for its protein. (24. A5; p. 8).

R Climate will always be variable. We know that. We are going to have some droughts, we know that. We are going to wet years, we know that, and what we have to do is adapt as best we can and that is why people have survived here.

IV Exactly. So I am using up my hour here. Is there anything I should have asked you that I didn't that you think is really important? You did a really good job of straying me in the direction that was good in this interview.

R Alberta Environment has a drought plan. I don't know if it is public. I am not really familiar with it even though I have a copy of it somewhere in my office. I think that would be a good document for you to get a hold of. (24. A5; p. 10).

Concerns were expressed by interviewees about the state of research in the federal government and research funding:

Again when they became part of this science and technology branch they went into the research model which is rather than having budgets allocated to managers to do whatever they felt was important there was a pot of money to compete for. They had to put in proposals. Well take a PFRA engineer trying to compete with a research scientist for research money. Well good luck with that. They have no hope because this is what they do, they write proposals and successful proposals. So they were going through a process I think there was \$7 million a year for proposal money and it was all going to the research people. (18. C1 part I & II; p. 4).

So definitely research on how to improve agricultural water efficiency, general support for improving the weather networks and things like that, very close work with the Minister of Agriculture to do some of the modelling. I don't know. The scientist there have been very strong allies, (19. C6; p.5).

I think well part of what my role is actually in DRCA is that we coordinate and then plug in Ontario climate portion which is another set up to another PARC, a similar model to that where we are kind of helping bridge the gap between scientific research and users that value conservation authority but who are supportive of those boundary organizations type thing that we are creating. Right now the DRCA is funding a lot of this research here ourselves because we believe in it and we know we need information but that is essentially it and there would be one other similar initiative that is going on but it is also sort of like a non-government organization that is not really well resourced to actually help municipalities in a really effective way and ultimately like in the absence of that like people can't afford to go and generate their own climate models. It is a pretty expensive and they have got other priorities to

do and kind of look at so they are either not going to do it or they are going to just kind of take of whatever is easy and available information which may be dated or not specific enough to their area. The same level of detail that they may use to make other decisions I guess. (20. C10; p. 5).

In terms of actual financial or monetary support from provincial or federal it is probably the same in that we have not gotten anything from them. I mean not much has changed in the last couple of years with regards to that. (20. C10; p. 6).

They seem to get involved through some other granting programs like the **Natural Resources Canada** does have granting but in terms of a broader I guess model for it, I am not aware of anything no. I hope that with climate change adaptation they would be aware of such things. I mean as an example of a border the national administration NOAH forming what is called a regional integrated buy in investment program and each of those are directed with a federal endowment and supports the kind of work I am talking about where you have some consistent group that is providing statistic climate data to an area and leverages federal science capacity and funding for adaptation projects and monitoring the value in reporting. I don't really see that sort of thing happening here.

IV Environment Canada is not doing that?

R No I don't think so.

IV Well not on the scale that you are talking about.

R No and not with any consistency. (20. C10; p. 6).

So I mentioned that in our organization we have no programs but the work that is being done NACIS, Allan Howard's group, so we have this NACIS and geometrics group. So one thing that the group is really strong is geometrics and just because of the [word] stuff we had and so that comes under Sherman Nelson as does NACIS so under NACIS you have got Allan Howard as the manager, National Agro-climate Information Service and they have got three groups there. One is the monitoring and reporting under Patrick Cherneski and that stuff you see everywhere their maps reporting status and stuff. That is used widely. It is on the web and updated every day. Then Harvey Hills group is the group that is doing all of the adaptational climate extremes. They have done a lot of good stuff in terms of the LIR project they have been working on and that is something that maybe those applications flood mitigation stuff, I don't know. They have done a lot of good stuff including the stuff that this VACEA work. (18. C1 part I & II; p. 19).

Even when you look at climate change, money is given out by the government, you know announced in the budget, Environment Canada only usually gets a tiny slice of it and the bulk of it goes to Natural Resources Canada. (01. C4. p.7).

From whatever our recommendations are in the report. I think definitely much better integration. We know that this is a huge challenge and we know there is a problem but I don't really see the level of response that is associated with other than actually I

think a lot of the national response tends to focus on building economies and just doing a strong economy will solve all of these other governmental problems but I challenge that premise and the question hasn't even been properly asked whether those economic kind of directions of the federal government really reflects the reality of the constraints of the physical like I don't know if that question has been even asked and tried to be answered. So to me that is a significant day of discussion and probably of priority in trying to get at a way of actually incorporating risk elements into a broader strategic question because you know if we are going to lay out direct economies for the next 20 years it is going to be built on oil then I think we had better ensure that oil sands are not going to make our risks, the hazards that we talk about being concerned about with drought and flooding. As an example I guess the other big challenge is like lack of data in the sense that there have been **a lot of closures to environment you know weather stations in the last number of years and the records for both weather and just environmental data is one of those gaps in it that has just become essentially really difficult to create good information that we can use for planning.** (20. C10; p. 7).

In addition, the federal Canadian government has downsized in the past several years. Concerns about the capital of the current labour force was expressed in addition to the current hiring practices of the federal government and specifically the hiring of technicians instead of engineers.

Well he is going to need something to do because he is a hyper guy; he is not going to be able to sit still. The province offered him a job. I don't know if you know Doug Johnson, he is the director of regional operations, he offered him a job. They have regional positions in their regional offices. They had one guy managing in both Swift Current and Weyburn, Clint Molde, well now he is not even doing that he is in Moose Jaw and he has a new job sort of planning the strategy for major economic development like potash mines, where is the water going to come from to support these in the Qu'Appelle for example. So Clint is doing that so those Swift current regional water management position and Weyburn are vacant. They had one guy doing both North Battleford and Nipawin after the guy there retired and then they have got a guy in Yorkton Jim who is now in Moose Jaw and is now the director of allocations and licencing but they have gone to the model where like Warren Thomson is there and they have engineering people and so like Water Survey of Canada they have gone to the model where they have got technicians all the water survey offices and it is not working out very well rather than having engineers. Environment Canada doesn't want to pay engineers; they would rather pay a technician less. (18. C1 part I & II; p. 7).

5.6 Risk and Climate Change (Perceptions)

Interviewees acknowledged that the climate was changing, and it was changing fast. "The climate has always changed it just changing a heck of a lot faster than we believe it

ever did in history and second of all never in history have we been as socially vulnerable as we are now to climate change” (01. C4; p. 6). The increase in extreme events is resulting in greater losses. Governments are starting to plan for resilience to climate change conditions (HS Oct282013, 5). However there is sensitivity to it, especially surrounding building in flood plains (C8, p. 9).

Emergency planning has grown in the past few decades and consists of the determination of “risk” and “risk planning.” These risks are identified by people, generally emergency planners, and generally are short to medium term risks. This determination is not an exact science. It is based on perception and subjective, and climate change is part of the equation. Long terms risks aren’t as prominent on the agenda of planners. An example of a long term plan was the building of the dyke around Winnipeg. “Even though the guy who did it took a huge political hit and people were just laughing at him for years until the waters rose and then they weren’t laughing anymore (C8, p. 2).

There is a large overlap between the areas of business continuity, enterprise risk management, risk management, disaster / emergency planners. However, there are important differences. Some planning models are contradictory. Adaptation is too narrow; resilience is required. Emergency management and security risk planning (i.e. for acts of terror) are also completely contradictory. In the former one looks for who can help and open communication. In the latter you don’t tell anybody anything, resources aren’t shared and it is difficult to work in this environment.

The issue with the incorporation of climate change into planning is twofold. First of all, the public doesn’t understand statistics or the science around climate change, and secondly, the media doesn’t give sound information to explain climate change. Instead the media focuses on sensationalizing a story, or a dispute around climate change science.

1. Interviewees acknowledged that the climate was changing, and it was changing fast:

The fact that humans may or may not have had anything to do with it is another question entirely. The fact is the climate is changing. The climate has always changed it just changing a heck of a lot faster than we believe it ever did in history and second of all never in history have we been as socially vulnerable as we are now to climate change. (01. C4; p. 6).

2. Emergency planning has also burgeoned in the past few decades:

Generally yes. I mean it is common sense. Here we are, we are a municipality, this is our sitting here, now city council says we need you to develop the emergency plan, the biggest question is what am I going to plan for. Well I mean you go on line and remember in 1992 this wasn’t very prominent back then, there wasn’t the information you can get off that computer like you can nowadays. I mean I can go on there and I can show you when you write emergency preparedness on there you got 54 billion hits you know around emergency preparedness. Back in 1992 well there wasn’t that much around. The federal government at that time had the emergency preparedness college in Arnprior, Ontario. (04. S7; p. 6).

3. Emergency planning is steeped in “risk” and “risk planning.”

We did a risk assessment almost two years ago. I mean organizations writing emergency plans should really start with a risk assessment because if you don't know what your risks are well. So if you identify say power outage is a risk, how frequently do you think that could happen, do we have one a year, do we have one every two years, or every five years. So we may not have them very often but the impact of having it is really, really great so it has to do with low probability, high impact if it happens so emergency planners are always, always struggling with that. (06. S6; p. 6).

4. Risks are identified by people:

IV So where do you get your information on that probability kind of impact?

R Well unfortunately most assessments are by opinion so if you have people together and that is what we did we brought people together and we used some voting software and based on people's information, background and experience in the health region what did they truly believe were the risks and the other risk assessments that I have done have been very similar. It is basically the opinion of the people you have pulled together and asked. (06. S6; p. 6).

Yes in what I call hazard working groups together do the risk assessment, identify our hazards because I have been doing emergency planning for a very long time and I write plans, but I don't all the pieces of the health region. I am not a nurse or a physician or facilities management person. I mean we need the experts to come together and do that and that is what we will be doing. (06. S6; p. 7).

5. However, risks are not something which occurs in the long term, they are something that occurs in the short to medium term:

Yes our federal ministry of environment, our federal counterparts Public Safety Canada, the industry itself, there are some organizations, we are not usually looking at very, very long term trends ourselves, we are more the year to year, season to season, what are we expecting next season because that is the game we are in. We are into what is coming up, what are the threats, what are facing, what communities are we are going to have to help through bad times this spring, this summer or this forest fire season or this winter. (08. S4; p. 14).

6. Long term actions are generally not politically feasible. For instance, the City of Winnipeg's actions created dissent:

R No we don't have that here for residences but we do for businesses but the idea is that the businesses are zoned more carefully than residential risks which are true but only to some extent. You still will have in Ontario the floods that come through and flood a lot of businesses. You had that in Quebec in the Sagoney flood, you had that out west you know with all the floods that come through Manitoba, but at least in Manitoba they have dust dyke, the diversion around Winnipeg.

IV Yes they have done a lot.

R Even though the guy who did it took a huge political hit and people were just laughing at him for years until the waters rose and then they weren't laughing anymore. (11. C8; p. 9).

7. A policy maker's determination of risk, and estimation of damage is not an exact science.

It would really be up to jurisdictions themselves to decide how they wanted to mitigate up to that 15% level. So if they wanted to take a look at a 1 in 100 year flood level and say okay we are going to use that 15% to mitigate only up to that 1 in 100 year flood level or if they wanted to do it using more of a forced exercise to look at what the future impacts would be regardless of the historical averages, then that would be up to them. The real limitation there is not what the calculation or risk assessment is it is actually just on the dollar amounts. (09. C2; 2).

8. Consciousness about how people change the landscape and the impacts this has is also believed to be increasing:

I mean the North American wetlands here 40% of North American ducks rely on our wetlands here on the prairies so that is pretty substantial and while ducks can be rather annoying you know getting quacks I don't think anybody would want to see ducks eliminated and of course certainly other birds as well. So I think we need to have a better appreciation of the dynamics when we change the landscape. What does that mean for climate change, for the economic viability so if we could work to say determine where the lie of the land is because the reality is when you start changing the landscape so somebody who used to be able to farm some land may not now be able to farm then it becomes almost a legal issue in terms of if farmer A has been farming this land for many years and all of a sudden farmer B decides to do some drainage which impacts farmer A who can no longer farm that land because of farmer B then it starts becoming both land use and a legal issue in my mind. (07. S5; p. 4).

9. Within the emergency planning community there is overlap and confusion of terminology and mandate. Business continuity, and enterprise or risk managements, and disaster/emergency planners have similarities, but differences:

I look at them as a set of diagrams. There is a huge amount of overlap and sometimes they are concerned about the same things but sometimes they are not for example a business continuity professional is concerned about recovering his own organization and that is it. So he will overlap with an enterprise or a risk and insurance manager but that risk and insurance manager he is concerned mainly about just funding quite often the recovery. He is not concerned about the actual business processes and the risk manager will also be concerned about broken windows which the business continuity person isn't concerned about at all. If you deal with a disaster emergency manager for a city he is concerned with recovering his entire society that can be damaged by a disaster. A business continuity person is only concerned about his own organization. So one is externally focused and the other is internally focused, and if you are a first responder you are worried about disaster from getting in there and putting out the fire and rescuing people. So it is really a huge amount but there is also a lot of difference as well and the worst part is the language is just similar enough to be confusing. So if I say disaster management to a business continuity person he will think a very, very early form of business continuity

that deals mainly with IT and recovering the computers. If I say disaster management to a disaster emergency manager he thinks this broad brush recovery of society with the four or five pillars of disaster and emergency management. So those are two diametrically opposed concepts that have almost the exact terminology. I feel that you can have two of these people in the same room and think that they will walk away from a conversation thinking that they have complete agreement and they haven't even been talking about the same thing. (11. C8; p. 2).

10. Risk is based on perception and is subjective; climate change is part of this equation:

R It is a risk management issue and risk is perceptual so if you look at the risk and there is a whole lot of uncertainty, this affects how people will actually perceive that risk and you know it makes the actual perception more difficult in that people may not actually react to the risk. The other thing is that they can use some of the uncertainty and some of the argument unfortunately to just not react to risk at all. I do not need climate change to tell me that there is a potential hurricane risk to Toronto. I know that. I know that I am not basically going to deal with a hurricane I am going to be dealing with a post tropical storm and I know that the very name itself which was Canadian is bad because it implies that it is not as dangerous as a hurricane where it actually can be. I know also that you have got all the arguments in climate change saying are you going to get more hurricanes or less hurricanes depending upon how you look at the energy grading from the pole to the equator. So you know I have got all of this argument about climate change mudding up the fact that you know what you have a hurricane risk here that perhaps you should address and this is the same sort of thing. Now fortunately we have addressed that in Ontario with the conservation authorities but then you have always got people trying to go in and build on lands that perhaps they shouldn't. (11. C8; p. 5).

Well the other issue again comes into you know we get a lot of talk on climate change but that has to be done definitely in context of what differences there were in the agricultural system over the years because if you start sucking up a lot of water and you are doing irrigation or you are changing your crops or you are doing all of these things you may actually be changing your water regime when your drought issues may not be necessarily from changes in rainfall but what you weren't doing, you know, what crops you are growing, how much water you are doing in terms of irrigation and so on. So all of that has to be taken into account as to what your issues are and I am not certain in some cases I think climate change ends up being lumped as the main driver in a lot of things when sometimes I am not certain it is. (11. C8; p. 13).

11. More and more extreme events are occurring and greater losses:

During our 16 years of operation we have seen losses in Canada increase at an alarming rate and global reports showing similar trends happening in countries all around the world. This is coincidentally happening with climate change and more and larger extreme events occurring. Much of the evidence suggests that most of the increase in losses is actually driven by factors that are not climate change. We have more people choosing to live at risk, we have behaviour change that is increasing our vulnerability, we have infrastructures that are aging, and we think climate change will become a growing part of why costs are going up over time. (12. C9; p. 1).

12. Some planning models are contradictory. Adaptation is too narrow, resilience is required.

The two of them, the emergency management and the security side, are contradictory to each other. I mean philosophically you would think that the security side is just another element of emergency management. You know the paradigm makes sense like that however in reality the players are so different from each other. In emergency management we have been slowly building this reality that when something happens you look around and you say who can help me. You know, Houston, we have a problem and you start sharing information, you share all sorts of stuff. In the security side right away you zip up. You don't tell anybody anything because you don't know what you are confronting and you want total control of the situation and you don't share resources and you know it is very, very difficult to work in such an environment. So coming back to the complexity of the issue nowadays in every situation there is the risk that something has been done maliciously whether internal and we have situations where there has been a pipe rupture of oil and gas and sometimes it is natural I mean the system broke down and sometimes it was malicious and then when it came to malicious it wouldn't be anybody wearing a turban it was somebody local that was not happy with the politics of it. So it makes the whole thing very, very complex. (13. C7; p. 8).

I'm not touching that. With respect you have used a term adaptive in a far too narrow scope. The adaptation that you are referring to is adaptation during response or at least that is the way I understood it and there is a lot more than that. In fact and I heard it in Geneva three years ago. The emphasis is at the global level and the national level is one of moving from planning and response to mitigation, adaptation and resilience. It is coming and hallelujah baby right because that is the way that we need to go. I will tell you my experience just yesterday I was in Calgary and I will tell you about that in a second. The adaptation is one of changes of behaviour at grassroots level all the way to national. National and international is one of developing strategies but the adaptation is one at municipal, grassroots level, whereby you are seeing changes of bylaws, changes of zoning regulation and stuff like that whereby those municipalities that have built in and around a river system or on a flood plain are recognizing the risk and the costs of repeated response to the same agent meaning flooding, at the same location almost at the same time of year and at an escalating cost and they say "Why are we doing it?" and that is great because now zoning allows them to move parts of the community away from hazards or prevent building or rebuilding in an affected area or a flood plain and moving the community higher. Slave Lake, 1988 I think it was, they had a flood and their business downtown area which was along the river front got flooded, a lot of damage, they moved, when they rebuilt they secured some seed money and allowed the major mall in the area to move up the hill to an open area where they can build there. So that was one example of that. So the whole notion of adaptation is one as I said of grassroots is coming, it is certainly occurring and it is in recognition of the otherwise phenomenal cost that you will bear during the response. There is another word that I want to introduce. Adaptation is great and it is a significant theme but in and of itself it is not sufficient. You need to also think about the term resilience or community building or resilience building or resiliency. they are all kind of the same notion and what it is not looking so much at the agent whether it would be a flood or a wind storm or earthquake, etc. but saying what can we do to ensure that our community is as healthy and capable as can be

to deal with whatever comes its way because then the community will adapt and it is basic building blocks the individual family and will be able to respond before they have a problem. So the literature on resiliency is growing by leaps and bounds. On Tuesday I was in Calgary and I had the honour of speaking to the senior management group, all the top administrators of all the branches at the City of Calgary, and they wanted to know how do we build a better recovery system through resilience building. So if a large City like Calgary that is extremely wealthy and not that impacted by disaster, yes they get hailstorms and they get their occasion flood and then they get basements filled and stuff like that but generally they are not like many of the United States municipalities who in parts of American have the earthquakes and the mudslides and all of that stuff. If they are interested and they are committing effort, money and priority to building resilience that is a good indication. (13. C7; p. 10).

13. Although flood and drought come in and out of public awareness based on their occurrence, in some areas people are constantly concerned:

IV But in flood years nobody is thinking about it.

R I tell you the southwest is thinking about it all the time. The guys in the southwest think a lot more about this kind of stuff than anybody else in this province. You know they do. We had drought down there for three years before it hit North Battleford and you never heard a squeak out of this government until a dugout went dry at Turtleford. It is a bit of an exaggeration but it is because guys in the northwest didn't know how to cope whereas guys in the southwest did and they have been coping for years. (14. S3; p. 13).

14. Although people have to be aware of the climate and risk of extremes in order to plan for them, government too has to have policies and tools in place to assist people:

20. How do you do that? Well I mean people have got to do their own risk assessment that is all. If I want to run a business that I think I am vulnerable to flooding or to drought, I should be prepared. The other thing is that the comfort zones of different people are different. You know I might be really risk adverse and other guys might not be so my neighbour he wants to have crop insurance up the waszoo because he is just scared of any kind of disaster and I might be saying you know what I don't worry about that because I am going to go out and I am just going to buy myself two years of feed and a drought hits and I am taking care of myself because I have hay in the backyard and all of us differ or you know somebody will always have a bale for me or something. We saw that this spring too. You know guys just weren't ready but it is just how different people react but what I am saying I guess is that the governments have to be more proactive in having tools or programs available that people can take advantage of to help them better prepare themselves and they have got to advertise those programs too and they have got to get out and network and try to encourage producers and make sure that people know that they are there. The producers or businesses have to be open to that as well too. (14. S3; p. 13).

15. People don't understand statistics and science:

Our climate scientists and even though you can find and I will call them the scientist wing nut on one end or the scientist wing nut on the other end, but in general does our

science community provide us good information for us to start thinking about it at a high level long term planning way, absolutely, but the general public and their lack of understanding specifically statistics can't participate in that.

IV Yes because they don't get it.

R No and they just don't. My dad doesn't know anything about statistics. You know he is 86 but he still votes and he still has opinions on whether climate change is real or not because of what he hears either one scientist gets interviewed or another and that is why the people who are doing us harm and you have heard me say this over and over again so if you are starting to hear a theme here, I don't like the press. I don't think the press serves humanity very well. I think that you should be able to pick up the Lethbridge Herald one day and it should have a really good explanation of what climate change is all about and what it means, but nobody would read it so therefore they would not sell a paper so therefore they are not going to do it. They are just going to take the one clip that is given by one of those wing nuts on either end of the spectrum and because they want a flashy headline but the scientists are doing an absolutely wonderful job of giving us the best information they can at this time and are governments using that information to do their long term decisions – yes they are, but you are not going to have a discussion in an open house in Taber on climate change. (17. A4; p. 16).

16. There is growing recognition amongst policy makers that with climate change, changes in the water resource may mean significant changes to supply and demand in the watershed:

There is five board members report to their ministers and the ministers about four or five years ago challenged the board and asked the question about the resiliency of the master agreement under future climate scenarios. So that came to us as the prairie provinces water board and as the committee of hydrologists to figure out how to do that and so we have been struggling with that. We had a little workshop and finally do you know what the invitation of drought tournaments that Harvey has been running. I have been the referee at several of those. Go to the site, I have a picture of me in stripes so I have been involved with those things from the beginning. I helped them put together a lot of the data bases. Mike Renouf attended the one in had in Calgary and the light bulb when on for Mike there and Dave Sauchyn was there as a participant and Mike said "You know this is exactly the kind of thing we need to do for testing the resiliency So that is where I see this going. We haven't had that discussion yet but this is something that the ministers, to their credit or not, but they came up with this question a long time ago - is this thing resilient or robust in the face of the future climate? So you might be aware of some of the work of Manitoba Hydro and they kind of asked this question a long time ago as well about the impact of climate change on Manitoba's power generation potential going forward under future climate and they retained Bob Halliday to look at this. This is probably four or five years ago and Bob's report concluded that any change in **demand in the watersheds will overwhelm changes in flow on the Saskatchewan River system due to climate change.** That was his conclusion that it is not something that you have to worry about. (18. C1 part I & II; p. 9).

17. Governments are starting to plan for resilience to climate change conditions:

IV Now there is response, recovery and then there is actually you know should be some sort of measure for building resilience given climate change conditions. Do you see any of that going on?

R Yes definitely. I think the municipalities are starting to turn their attention towards it pretty readily. We did seek quite a response in the matter of a storm here in the summer where a lot of municipalities kind of rapidly started asking questions about what are we doing around climate change and can we be doing more and I know there has been a lot of sort of auditing activity taking place about where money and long term changes. I think that the response or the level of engagement provincially and nationally is actually pitiful compared to in light of the issue than from municipalities. So I think definitely much more can be done. Those levels as it turns out especially scientific you know accessing the information and data required to make informed decisions [words] the weight of that where municipalities [words]. (20. C10; p. 5).

18. Although there are stated sensitivities to this:

IV This is a sensitive one. Some of the media has been talking about how this flooding is something that has happened a lot over the past and even before 1930 it has happened several times. So I am kind of wondering and kind of in line with our mitigation talks is building within flood plains and providing funding, the disaster response funding that will come through because insurance won't cover it, do you see any kind of ability there to influence local developments and municipal zoning whether people are actually going to build right back into the flood zone in High River that they were on?

R Yes that is the big question that has come out of this. I think there are a couple of aspects to it. In reality the communities like the infrastructure and buildings that are in the flood plains are there already and whether we want to go ahead and say well you can't build your house or you can't develop land in the flood plain going forward, I think that is definitely a question that we will be looking at and I don't know what that answer is. So what I am saying is that I don't know that you could have really prepared for what came. The floods themselves like we have never experienced anything even remotely close to them there. We had a very large flood in Calgary in 2005 which was considered one of the largest. This one was five times that size just in Calgary alone and we have never had anything like it. All of the cities and all of this area inundated that quickly before so like I say that is a very live question, what now and we are still very much in the tying up the response phase and into the recovery phase and we will be looking at those questions as soon as we have some resources to do so.

IV And what about in the future, the likelihood of these issues occurring, do you look at information and data on that type of thing?

R We have flood modelling capabilities but like I say I don't think anybody even in our worst nightmares would have approached anything like this but again I think that is going to be part of the post-review what type of modelling do we do, how can we use that, are we using it the best that we can. I am not an expert in that field so I can really say. (23. A6; p. 9).

5.7 Institutions and Public Safety

The federal government offers numerous services that relate to flood and drought and emergency. One federal government employee recounted many of them and their function. These include: Natural Resources Canada, Environment Canada, Agriculture Canada, NRCan, a federal council with all departments with a role in emergency, Drought Watch, etc. The federal government does not get involved in the policy side of planning for droughts, however. The primary outreach vehicle of the federal government is the platform established pursuant to the Hyogo Framework: There is support for purchase of mitigation equipment in the case of emergency. The Red Cross provides a fundamental service within Canada. In many small Saskatchewan communities, there is supposed to be an emergency plan, but it consists of a number on the wall (who to phone). The Ontario College has been closed, however, the federal government still provides a program to pay 50% of costs for certain equipment and supplies.

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I think Natural Resources Canada gets involved in that. Environment Canada, I mean they call it water survey, but really what the water survey of Canada does is it measures stream flow and discharge like it calculates discharge from surface water. So it is much more of a hydrometric program so measuring the actual flows. (01. C4. p.1).

Drought Watch gets more I think Environment Canada, Agricultural Canada and maybe NRCan but it may be primarily Agriculture Canada but they use our information along with other information. (01. C4. p.2).

I mean the local police had sent out a request like what we have is in each region or each province the federal government has what is called a federal council where all federal departments in that province have a seat and that federal council also has a member from Public Safety Canada on it and there is connections that are maintained or communication lines that are maintained between the federal departments, the federal council and the emergency response in provinces.. (01. C4. p.10).

IV Right like your drought watch is pretty general. You're tracking of climates and I used to call it hydrological levels like from my recollection when we did this in relation to water governance there is only some very specific interprovincial points that you actually do measure like the numbers of them aren't in the thousands let's say they are smaller than that – so it that kind of accurate.

R Yes they tend to be either locations that have been specified in treaties or memorandums of understanding or on representative waterways you know because you really can't do every creek that crosses a border but when you look at being able to model water regimes for instances there is usually indicative flows and so you take the few either main or very typical waterways and monitor those.

IV So in relation to where the provinces monitor water or municipalities, you don't really get involved in that type of thing?

R Well actually the water I mean if we are looking at water levels there is one hydro-metric program for all of Canada and it is based on a series of bilateral agreements between Environment Canada and the provinces. So what we have in each province is kind of a workload sharing. So you will have some provinces where well Quebec for instance it does most of the hydrometric monitoring so Environment Canada pays them because we don't do a lot of the work whereas in most other provinces the provinces have deferred to us and they want us to be doing the monitoring so they end up having to pay us. So in Alberta I think of the stations that are here, and I can't tell you off hand how many, I think two-thirds are managed by Environment Canada and one-third by the province and so they give us money to kind of even it out. (01. C4. p.3).

IV So do you actually get involved on the policy side of planning for droughts?

R Not directly. (01. C4. p.5).

So I mentioned that in our organization we have no programs but the work that is being done NACIS, Allan Howard's group, so we have this NACIS and geometrics group. So one thing that the group is really strong is geometrics and just because of the [word] stuff we had and so that comes under Sherman Nelson as does NACIS so under NACIS you have got Allan Howard as the manager, National Agro-climate Information Service and they have got three groups there. One is the monitoring and reporting under Patrick Cherneski and that stuff you see everywhere their maps reporting status and stuff. That is used widely. It is on the web and updated every day. Then Harvey Hills group is the group that is doing all of the adaptation to climate extremes. They have done a lot of good stuff in terms of the LIR project they have been working on and that is something that maybe those applications flood mitigation stuff, I don't know. They have done a lot of good stuff including the stuff that this VACEA work. (18. C1 part I & II; p. 19).

2. The primary outreach vehicle of the federal government is the platform established pursuant to the Hyogo Framework:

So the primary outreach vehicle that we use for that is Canada's Platform for Disaster Risk Reduction which was established in 2010 under the auspices of the Hero Framework for Action which was kind of an non-binding agreement among 168 countries under the United Nations Strategy for Disaster Reduction and basically Canada's platform has been recognized by the United Nations as one of the most open and inclusive platforms in the world. So we are kind of consistently referenced as a best practice and the way the platform works is that there is ongoing work, a bunch of different interdisciplinary working groups that happen throughout the year and that platform gets together once annually at an annual national round table for disaster reduction and so it brings everyone together in plenary and includes folks from all levels of government so federal, provincial, municipal, the academic sector, the private sector the S and T sort of government contract and researchers as well as other science and technology practitioners, insurance industry and it is a very open membership model so anybody can apply, anyone from private institutions all the way up to IBM or big multi-national corporations. Anyone is free to participate on any of the working groups based on the working groups own

terms of reference. So we see a lot of really interesting things start to play out with all of those different levels of players coming together. (C2, p.4).

3. There is support for purchase of mitigation equipment in the case of emergency:

Oh sure they do and things like dehumidifiers, power generators, anything that might kind of assist the next time around as well or prevent flood mitigations, sump pumps and things like that might assist the community they can apply for those as well. (03. S1; p. 12).

4. The Red Cross provides a fundamental service within Canada:

IV I wanted to ask about the Red Cross like it is really, really well known internationally. So when you interlink with how you plan and what you do, your policies, are they kind of fed down from Red Cross Canada or the international body? How does the Red Cross kind of work? Is it separate from the international?

R I guess the very core of it is the fundamental principles that guide the entire organization but in terms of structure it really is I suppose Canadian in nature and then we have zones across Canada. So we belong to the western zone which includes the four western provinces. So even within the zone we try to develop systems or processes that will assist you for the entire west in this case. (03. S1; p. 13).

IV When I go on line and look at sources about the Red Cross that is kind of what I find is there is an incredible data base at the international Red Cross on all of these issues and how they planned and responded to international. So for me I kind of see that all on line and it is trying to figure out how does the local Red Cross function and then the next stage will be we have researches in Latin America with how the Red Cross functions down there which will be culturally and contextually different down there and our study is not about the Red Cross. It is really about how the whole system works.

R Right and well there is always the link if you have a disaster hit like Hurricane Sandy let's say you know and you need to deploy people so there is sort of that link because it is run through AM Cross or perhaps internationally if it is elsewhere where you are deploying people or let's say donations come into your local Red Cross office here in Regina, Saskatchewan and they want the money to go wherever. So the ties are there. (03. S1; p. 14).

5. In many small Saskatchewan communities, there is supposed to be an emergency plan, but it consists of a number on the wall (who to phone). The Ontario college has been closed, however, the federal government still provides a program to pay 50% of costs for certain equipment and supplies.

In Saskatchewan and I will stick with Saskatchewan because every province does it different. An example would be flooding in Saskatchewan up until 2010 I am sure that when you talked around nobody ever considered flooding as a big thing because it hadn't occurred now since 1974 was the last time. There was a time between 1972-1974 and all

the people that responded to that and all the people who were in charge and all the government officials that were there are no longer there and when you go back and look at the emergency plans that were there, they are no longer there.

IV Where did they go?

R Emergency plans have their own little heaven. The heaven usually is a shelf and it sits up about that high [shows] and there will be a binder, the emergency plan, and when you open it up unless it has been maintained and kept up-to-date and training done because that is what it is a training manual. You write all the emergency plans you want but unless the people know how to do it, it is useless sitting there. Remember that because that is the most important thing in emergency preparedness.

IV Because nobody has time to look at the manual?

R The law requires you in the Province of Saskatchewan under the Emergency Preparedness Act every municipality must have an emergency plan. I know for a fact in some communities, small towns, small rural municipalities, the emergency plan is the phone number of the Provincial EMP written on a wall. That is their emergency plan and I have been told that. What do you do if you have an emergency? Phone them. (04. S7; p. 2).

We formed the Emergency Preparedness Association.

IV And who was in that?

R At that time the provincial EMO had five staff in the province and there was the director, two officers and a couple of clerical staff.

IV Who funded them?

R At that time they came under the municipal government, the department or Ministry of Municipal Government. They are now separate. Municipal Affairs is what they were called back in those days.

IV So now they are not part of the government?

R Oh no they are part of the government but not part of Municipal Affairs. They are separate now under Corrections and Public Safety and that was a big move that needed to be made because what happens is emergency preparedness and the same thing occurred in the City of Regina, emergency preparedness the law required them to have an emergency plan and an emergency planning coordinator. I am going to jump all over the place here. I met the emergency planning coordinator for the City of Regina for the first time in about 1980 and at that time I was heading up the police bomb squad and the police department at that time was looking at gosh maybe we should have some better planning. (04. S7; p. 3).

6. In Alberta, although there are many non-governmental groups who could be involved in planning and response, the provincial government isn't prepared to delegate authority.

R I am trying to think of the word that I need to put on that one. I don't believe the government is prepared to give up the authority to make those decisions and they don't want to give the decision making to a single group that is going affect cross government a whole bunch of different groups.

IV Good way of putting it.

R If you give them the authority to do something it is not going to just impact the irrigation districts, it is going to impact every town, city, every watershed, every river, every lake, parks, recreation. There are so many different intertwining groups that I can't foresee the government allowing the responsibility to go a non-government entity. (22. A4; p. 8).

7. In Alberta, the Irrigation Associations have voluntarily taken then position that in times of water shortage, they will be subservient to the needs of people, livestock and then crops.

Discussion around licensing, the 13 districts have an umbrella organization called AIPA, Alberta Irrigation Projects Association, and it was around 2011 or 2012 when there was this talk during a time of severe drought or time of severe shortage yes we have senior licences but it doesn't make sense to be putting water on say low value crops when there are livestock or people that really need the water. So they have sort of made an internal decision and I think a copy is available on the AIPA website and I don't know if it is a bylaw or a declaration that in times of shortage their priority for distributing water is people, livestock and then crops. (21. A3; p. 7).

8. Alberta is undertaking a desk top study of water needs.

Alberta Agriculture does have a desk top computer study underway to assess other storage opportunities in the South Saskatchewan for different goals. One would be to reduce risk for current licence holders, one would be for meeting First Nations water demands and the other one is for environmental water so that district flows type of water. So that is a study underway right now. I believe they are due to wrap up here early 2014 but it is just an assessment to see okay what other opportunities are in that basin for storage works to meet those three goals. There are all kinds of other works going on to assess specifically flood mitigate types of storage. It started in the Bow and I believe they are moving down to the High, the Sheep and possibly the Oldman and that is just to sort of look at what are the opportunities topographically, where are places that we could hold back water. There was a public announcement here last week or the week before that there are three projects that have approved to go to study. One is a diversion like a bypass around High River, one is a dry dam I believe on the elbow system upstream of Calgary and the other one is some kind of diversion perhaps an underground diversion from the Glenmore reservoir to downstream of Calgary to the Bow. I am not sure how they arrived at those three but those were three that were announced and they are going to go to feasibility, economic study here and I imagine that work is already underway. (21. A3; p. 11).

9. Alberta will review its laws, regulations and policies as a result of the 2011 flood. There is a fluid response amongst Alberta government departments at the time of an emergency.

R We had just sent in a request to do a consultation and update that act and those regulations and it didn't even get up the full food chain and the floods hit. So it is certainly going to be a much different review this time because before we have never done some

of the things that we have done like before we never exercised certain parts of the act which we did this time. We were really in some uncharted waters so it is going to be very interesting to hear the review of the incident.

IV So do you actually have a review force tasked with that yet or it is just something that will happen in due course?

R It is something that will happen in due course but because it is so sizeable. I would say that the response phase is over for the most part. It is now really trying to find out the scope and scale of the recovery phase which is probably going to take decades just based on what we are hearing and the scope of it, the damage done and the extent of it is just incredible (23. A6; p. 1).

R ..So for example if it were a wild fire, our wild fire fighting subject matter expertise is with Environmental and Sustainable Resource Development. They will come in and will say okay we have the expertise, we will use your staff and your command structure and all the stuff, but we are lead. Whereas if it were like a terrorist threat Justice and Solicitor General Department in the Government of Alberta would then be the lead agency and we would serve the same function for them.

IV Does that cause problems when it is different lead agencies?

R You would think it would but that is why I say it is surprising. It is very fluid in the sense that people will come in and come out and the lead will change. So for example it could be a little bit more challenging when you have two incidents going at the same time say like a flood and a wild fire but we are a small community in the emergency management side. We have all worked together, we have all trained together and responded together so many times that it is actually very natural and it doesn't seem to pose any considerable risk (02. A2; p. 1).

5.8 Limits

The information provided in this Integrative Discussion stems from the twenty seven interviews described in section 3.4. The information is based on the perceptions, opinions, and understandings of the people interviewed. Interviews were not double checked for technical accuracy. There may be errors in information if the interviewee misunderstood the question, or the information which was relayed by them in answer. Every effort was made to ensure that information reported was consistent with secondary sources.

6. Conclusions

6.1 Intro

The following sections analyse the drought and flood governance system in relation to the features of adaptive governance identified in section 3.3 of the Methodology.

6.2 Adaptive Governance

6.2.1 Responsiveness

The governance institutions in Alberta and Saskatchewan are highly responsive in the case of flood; in the case of drought, a creeping hazard, less and less is being expected of government in relation to agricultural producers livelihoods. More onus is on the individual. However, as the climate continues to change, and water becomes scarcer, issues of water quantity and quality may increase into the future. It is unclear if these issues will be handled responsively in the future.

Extreme climate events of drought and flood are and have always been a constant in the Prairies. Each study area has a long history of adapting to these events and accounting for ecosystem dynamics. This can be illustrated by the livelihood asset mix in each study area: mixed farming occurs in the Shaunovan area versus the irrigated farming occurring in Taber, Alberta.

The geographical reality of drought and flood are different in each study region. This impacts responsiveness. In Saskatchewan, flood events can occur from high water tables and heavy precipitation. Generally, some forewarning of the building flood risk is available (albeit the Yorkton flood of several years ago was quite a surprise). In Alberta, the mountains add another dimension to flood. Rain in the mountains can very quickly cause flooding downstream. Interviewees confirmed that in Saskatchewan a season of flooding one year increased the ability of communities to respond to flooding proactively (through measures such as sandbagging) the next year. Flooding in Alberta in recent years resulted in a flurry of infrastructure projects aimed at alleviating future flooding. Several interviewees did express the opinion that it was wrong to reduce vulnerability through infrastructure projects; making people less vulnerable, moving them, educating them was more appropriate.

Early warning systems exist in two major mediums. First the federal and provincial governments provide information on the internet in a variety of forms from Drought Watch, to services informing residents of which highways are flooded. The second method is through informal communication channels. A committee exists which assists the municipal government in Shaunovan get messages out to citizens. Rush Lake relies on an informal networking of telephone contact.

The long history of climate variability in these areas has given rise to an extensive policy suite of instruments summarized in section 4.5 and 4.6 for responding to these events. In relation to drought onus is on individuals to make proactive drought proofing decisions and engage with the available instruments. There is less tendency for government to

provide relief to agricultural producers for drought based on declarations of disaster. Producers are expected to insure for these events.

The 2001 drought was met in all study regions with an extensive set of adaptations in agricultural practice and a novel water sharing arrangement in Alberta amongst water users. This responsiveness bodes well for the future. However there was sentiment that this even occurred sometime in the past and as the arrangements were not documents, not institutionalized, they may not be repeated in the future.

The responsiveness of governance institutions to flood is very high. Emergency personnel respond immediately to flooding events providing services. The Red Cross is contracted to provide human support services. Volunteers within and outside the community are plentiful. Local governance interviews stated that sometimes there were too many volunteers than could be managed.

6.2.2 Reflexivity

Reflexivity is the ability of a governance system to formally and informally reassess practices for assisting adaptation to climate variability, hazards and extreme climate events. Part of reflexivity is social learning— do people and processes improve as a result of an event, or in anticipation of an event? Is there a real and demonstrable change in attitude and behaviour? Is there constant monitoring and evaluation processes in place to see if learning and improvements have occurred? In order to learn, a necessary environment must be created. Are institutional patterns in place that promote mutual respect and trust between actors and an openness towards uncertainties?

Section 5.5 sets out details of the theme of learning that was discovered in the interviews. It is troublesome that regardless of past flood events, detailed studies and recommendations that have resulted, no significant progress has been made in implementing recommendations made in the studies. Interviewees expressed frustration. Further, best practices of disaster recovery response documented in the United States and other parts of the world are not being implemented. Instead of employing a disaster resilience model a critical incident response model is the dominant paradigm.

The most alarming finding relates to the “securitization” of emergency planning and response discovered (and embedded in the critical incident response systems). As acts of vandalism or terrorism are handled as matters of security and with limited information a model very different from the disaster resilience model of emergency planning predominates, even in respect of events of flood or fire. Vestiges of this can be seen in the local governance reports when discussion occurs around “communication” channels and ensuring only one message is given out at the time of a disaster. A paradigm of secrecy and control permeates the emergency planning model.

Several interviewees were of the opinion that flooding has always occurred. However, the vulnerability of people and communities is increasing because of:

- o More development and the reduction of natural barriers to flooding;
- o Increasing numbers of finished basements in houses;
- o Increasing technology and items which can be damaged being housed in basements;
- o Continuous residential building in flood zones.

One interviewee did state that in the discussion surrounding flooding, flood zones, and disaster assistance, these factors generally don't get discussed. It would appear that reflexivity occurs in a narrow way, not in a holistic manner.

6.2.3 Flexibility

The literature concludes that governance systems that provide for improved capacity and resilience are those that respond to extreme events in a flexible manner, as appropriate to the situation, context and needs of a particular community. This relates primarily to unanticipated events and the ability of a governance system to respond to the unanticipated. The question is whether practices can be modified, extended, and changed quickly in response to these unanticipated events? Our research found a great deal of flexibility exists when there is water scarcity or at the time of a drought. However, flexibility in relation to flood wasn't apparent.

The drought of 2001 illustrated a high rate of solidarity in towns such as Taber where voluntary water rationing solved municipal shortages. Cabri took the step of not allowing agricultural producers access to the town's potable water supply. The transferring of water interests which occurred in 2001 was also accompanied by less formal "sharing" agreements within Irrigation Districts. Irrigation producers waived their priority rights of the first-in-time-first-in-right system agreeing to produce a crop on one person's land and leaving the other's fallow (then sharing whatever profits accrued). These producers recognized the importance of community relationships as a resource, shared local communal decision-making, and trust were emphasized. One interviewee stated:

...guys in the early 80's basically invented water sharing .[it] wasn't legal at the time... as long as everyone agreed and no one was injured by it. No complaint, no problem.. It's not going to work if you have to do it over a broad area where people don't know each other.

This sentiment of "doing the right thing" instead of pursuing legal interests, legal priority and courts of law also appears with the passage of the AIPA declaration of the priority of the human use of water.

Examples of municipal response to water scarcity and drought also display this flexibility. Municipalities request residents voluntarily reduce water, and utilize water for yard and outside uses only on certain days of the week. These practices have been found in the local communities to work very well in times of shortage. In fact, increasing water prices in order to try and make people reduce usage has been found not to work (Warren, 2012).

Interviewees expressed the view that disaster assistance payments from government to agricultural producers in times of drought were difficult. Administrative issues arise when producers who did not buy crop insurance receive payouts similar to those producers that did astutely purchase crop insurance. This was sighted by a few interviewees as a time when perhaps governance systems should not be flexible.

Response to flood exists at the individual, municipal and occasionally provincial level, depending on the extent of the event. At a certain point during the High River Flood, the emergency responders took control of the flood as residents were forced out of their homes against their will. It seems that at times of flood, the incident command response,

and the legislated disaster relief system is endemic to allowing flexibility. However, certain things that interviewees said perhaps should be included as inflexible were not. This included providing disaster relief to a homeowner, only once when a homeowner is located in a flood zone. Instead, it would appear from the interviews and review of secondary sources that a homeowner could claim in subsequent years for relief from flood and keep rebuilding. There would appear to be certain aspects of governance in relation to flood and drought that are better left inflexible.

6.2.4 Capacity

The capacity of the governance system to respond to extreme events is an important determinant of the vulnerability of a community and an individual agricultural producer. Capacity includes the informational, human, and social capital in existence that is necessary to respond appropriately to climate variability, hazards, and extreme events. Human capital might include both human presence for counselling and assistance as well as leaders capable of acting in response. Information is an important component of capacity as it is necessary to be forewarned about extreme events not just in the near future, but also in respect of long term scenarios. The latter requires having access to the science of climate variability and extreme events.

Informational and human capital is decreasing. Although the province recognized responsibility for assisting communities with planning, providing training and education, and in the case of escalated disasters, assistance to the communities, the federal government has withdrawn from any role in this regard. This reduction of informational assistance is increasing vulnerability:

- Most significant is the closing of the Canadian Emergency Planning College in Ottawa which provided federally subsidized training for emergency planners all across Canada.
- In the mid-1990s flood plain mapping was disbanded by the federal government due to budget cuts.
- In the past few years Canada has withdrawn from both the UNFCCC and the International Covenant on Desertification.

The federal government provides meteorological and hydrometric data through mechanisms such as “Drought Watch” and the services of Environment Canada and NACIS (National Agri-climate Information Service). The federal government (Public Safety Canada) also provides a platform – or “secretariat service” - for emergency and disaster people to exchange information and ideas, but at their own expense. Concerns were expressed in many interviews over the state of research in the federal government and research funding including:

- o Numerous closures of weather stations over the last number of years;
- o Gaps in weather and environmental data exist;
- o Problems in creating and accessing good information for planning;
- o Federal government units and employees having to compete for funding of research;
- o The hiring of technicians in relation to water roles, not engineers;

o The downsizing of the federal government in relation to agriculture and environment. Social capital at the community level remains high. At times of flood and drought, local community residents come together, volunteers arrive from other communities, oil companies, Hutterite colonies and many more band together.

6.2.5 Equity

The assessment of the fairness of the water and extreme climate events governance regime in process and impact is a normative exercise. A few comments can be made. First institutionally, the local municipalities have always had certain responsibilities in relation to drought and flood. These are becoming accentuated mostly because of the withdrawal of the federal governmental presence. Although this leaves provincial governments more leeway in policy and response, the brunt of the burden is born by the local municipalities. This is straining already financially challenged municipal governments and impacting capacity (item 6.2.4).

The institutional governance system in respect of both flood and drought is helping a significant number of individuals adapt to these increasingly frequent events. However, there is a segment of people who are not being assisted. Small business owners, small agricultural producers, and those struggling to make ends meet. For these individuals they cannot afford measures like crop insurance or income stabilization programs, nor afford expensive adaptations such as irrigation.

The High River Flood of 2013 illustrated that low income people, and wage earners in High River employed by local business were significantly disadvantaged by the flood event. These people didn't have access to funds to rebuild and restore their houses, and labourers in the small businesses that were lost also lost their jobs and had to relocate. Conversely, high income people continue to reside in the flood plain, and in Calgary (the capital city) in particular these people are fortifying their properties with new pump systems, more resilient building materials and even metre-high concrete barriers around the yard (Markusoff, 2014).

A communities' economic capital is significantly impacted in times of drought and flood. At times of drought, communities often have increasing costs as local governments deliver water to homes, and occasionally road maintenance equipment is damaged due to extremely dry conditions. Similarly, during times of flood, local communities are often left with replacement of bridges, culverts, and roads wiped out as a result of storm and running water. Many are concerned that these local communities are strained in relation to financial resources. Monies that were provided to the town of High River were reportedly wasted on expenditures such as re-sodding green spaces. As recent as ten years ago these areas had been cow pastures. One interviewee thought this money would have been better paid to the low income people of High River. Interviewees who discussed the continuous pay-outs by government for these events noted that the increasing trend of payments was very high and were concerned that a breaking point for this expenditure was near. Interestingly recently the maximum limit of replacement money for houses was disbanded (it had been at \$100,000 per house) resulting in increased government exposure.

None of the study areas involved local community people in planning for emergencies. Nor did these communities involve local people in practising scenarios of emergency, or preparing to respond to emergency. As result, opportunity for local knowledge, local priorities to be reflected in plans is absent. For the most part a specialized bureaucratic technocrat is in charge of emergency planning.

6.3 Inferences

It is evident that there is a highly evolved, complex institutional structure which assists agricultural producers and local communities respond to extreme weather events of drought and flood. This system is highly **responsive** immediately after a disaster such as flood providing relocation, food, emergency clothing and shelter. This system includes government (all levels), non-governmental organizations, emergency personnel, and volunteers. A community of emergency planners actively prepare for disasters, including flood, and local communities have awareness about the need for plans, and sometimes written plans. Regional planning is a growing trend in all study areas.

As drought is a creeping disaster, it is responded to more by the informal governance institutions which are coincident with and buttressed by a strong local community social capital. There is also a significant governmental institutional capital available to allow agricultural producers (who can afford to) to plan and prepare for an extreme event of drought via government programs. A strong sentiment exists that these events are often best left to individual producers and regarded as business decisions. Alberta does have a drought plan; Saskatchewan does not, but does have an institutional government committee for immediate coordination of resources and responses.

The governance system in relation to droughts and floods is lacking in **reflexivity**. There is a gap in the incorporation of and understanding of climate change science in relation to the governance of these events. Often these events are considered in isolation, and not as part of the bigger climate system or in relation to future climate change. Because of this, there isn't a deep level of reassessment of informal and formal processes for building resilient communities. The fragmented nature of considering these events prevents holistic planning. Further, the trend to "securitization" in emergency planning, or the trend to plan emergency as a response to acts of vandalism or terror, moves the institutional governance system away from a community resilience model. The community resilience model would involve the community in planning for extreme events, preparing and performing scenario training for these events, and responding in a coordinated, holistic fashion. This process would involve the public, ngos, and volunteers. American and international literature confirms that this approach build resilient communities.

Because of strong local social capital in the study areas, a **flexible** governance system responds to events of drought. This is highly beneficial. However, after the initial response to flood, flexibility was not found to be beneficial. Discrepancy in the treatment of flood victims and their financial claims, lead to discord. By allowing rebuilding in flood plains for qualifying individuals, and providing potentially multiple payments in future years to the same flood victims, maladaptation is occurring.

Significant federal resources have been withdrawn from the institutional governance structure in relation to emergency and flood response which challenges **capacity**. It is

unclear that provincial initiatives in relation to flood plain zoning and community planning have filled the gap left by this retreat. Other issues of capacity are outlined in 5.5 Learning and the reduction in information available.

Concerns surrounding **equity** existed both at the local community level (different communities having different resources with which to respond,) and also at the individual producer level. Different producers have access (depending on financial resources) to government policies and programs which would assist them in preparing for and responding to extreme events.

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8. Appendices

8.1 Organizational Map

8.2 Fieldwork Guide

FIELD GUIDE FOR GOVERNANCE ASSESSMENT

This appendix contains the fieldwork guide to organize each one of the assessment interviews.

A. Purpose and Scope

The Governance Assessment Field Work Guide is an outline of research themes and questions which should be addressed in the semi-structured research interview. ***This is a practical guide, designed to help you with the scope of the interview, and is not designed to be used as a questionnaire – think of it more as a checklist of themes that need to be addressed.*** The goal of the interview is as natural and free-flowing a conversation as possible. How you word particular questions, the order they are asked, and how much depth you go into will vary.

The themes outlined below will allow for the collection of information from identified governance organizations and actors which will allow the VACEA project to assess the institutional capital in existence to reduce the vulnerability of the community to climate variability, hazards and extreme events.

B. Set-up and General Background Preparation:

The organizations and people to be selected for interviewing will be chosen based on the institutional profile assembled and the assistance of the VACEA project partners

Prior to the interview, all researchers are expected to have a thorough understanding of the general principles of institutions relating to climate variability, hazards, and extreme events, and water management.

C. Pre-Interview:

Research the organization – know its mandate and geographic scope, as well as the position of the contact. You should have spent some time with the organization’s website and have acquired good knowledge of its areas of concerns, issues, etc. If there are publicly available documents produced by the organization, be familiar with them. (Bottom Line: be thoroughly prepared before you ask people for their time)

D. The Research Interview and Themes

Goal of the Interviews: To ascertain how the institution fits into the governance framework respecting climate variability, hazards, extreme events and water, identify how the organization reduces vulnerabilities of the community, what factors contribute to this, and lastly, whether the characteristics of adaptive governance are present in the organization and its interrelationships with other organizations and community members.

The points below represent **themes** that should be explored. However, the order in which these are addressed and the language used will vary by interview. Depending on the context, there will be instances where particular topics warrant greater depth than the questions below indicate to meet the goal of the interviews. The interview guide assumes that the interviewer has a high degree of familiarity with the subject matter and comfort with open-ended, loosely structured interview techniques.

The main points (in bold) are general themes. The bulleted lists are points you need to address. It is always preferable to gather the information in an open-ended fashion, and you should resort to specific prompts only if necessary. Think of the questions as questions to you, the researcher – you should be able to answer these based on what you learned in the interview?

Part 1: General Information Questions /Setting the Stage

This part of the interview situates the person being interviewed within the larger picture of the institutional profile prepared in the community vulnerability assessment. Details surrounding the entity with whom the person is associated or employed and that capacity should be ascertained. Much of this information should be ascertained from secondary sources and these questions can be only in relation to specific questions the interviewer has after reviewing other sources. Questions might be:

1. What is the role of the institution with respect to water, climate variability, hazards and extreme events, and what is the role of the respondent within the institution? (This will assist in assessing the existence of responsiveness and flexibility).

- What is the role of the institution with respect to climate variability, hazards and extremes, water and climate change? What is its area of institutional responsibility or jurisdiction? How do water and weather condition relate to its mandate?
- What is the position of the respondent in the organization? What decision-making or administrative tasks relative to water and climate does he/she routinely perform?

2. What past climate variability, hazards and extremes, or water stress has this organization faced, managed, and mediated, and how? (This will assist in assessing the existence of responsiveness and flexibility).

- In what instances has the institution faced climate variability, hazards and extremes, water stress in the past? When? What were the effects of it?
- Was there an institutional response to climate stress? If so, what was the nature of the response? Was this part of the institution's existing mandate at the time? Did the mandate have to change and if so, how quickly did this occur?
- In times of crisis, were there unprecedented measures/ad hoc responses which became necessary? How were these implemented? Were new protocols developed? Do early warning systems exist?
- How flexible has the institution been when it comes to responding to water stress? If the past water stress occurred now, how would things be different?

Part 2: Open-Ended Interviewing on Exposure-Sensitivities, Adaptive Strategies

The purpose of this part of the interview is to ascertain how the entity involved in the institutional profile fits into the vulnerability and adaptive capacity framework.

What policies and actions of the entity respond to climate variability, hazards and extreme events? What type of planning occurs?

This part of the interview should be informed by issues that have arisen in the community vulnerability interviews with community member. Based on indications from community members as to their contact with governance organizations in relation to climate variability, hazards and extreme events, the assistance provided by these organizations should be explored or the role of these organizations in relation to the specific climate events identified by the community.

(This will assist in assessing the existence of responsiveness and flexibility).

3. Does this institution plan for climate variability, hazards and extremes, water/climate stress, and how?

- What type of long-term planning is done w.r.t. climate variability, hazards and extremes, water/climate (refer back to routine decisions, past times of stress as needed)? How many years is the planning time frame?
- How is planning for variability done? What factors are considered? Is there explicit consideration of climate change / long-term scenarios of water availability / moisture deficit / forecasted demand?
- Are there contingency plans (emergency preparedness or business continuity plans) for particular situations? Are these short, medium, long term? How is the decision made to implement these both procedurally and substantively?
- How does the institution reassess these plans? Is there monitoring and reevaluation? Is there a set review period? After extreme events are they reviewed? Who has input into the review? Are changes made based on the review?
- The VACEA field work will have identified various concerns raised by stakeholder during in-community work. Does this organization help address these concerns? Is this part of your official mandate? How does the organization become aware of concerns (link to stakeholder discussion)? How does it know the outcome of actions taken?

- Does this organization promote capacity building and problems solving in rural communities? How does the respondent define community capacity building?

Part 3: Guided Interviewing

- This portion of the interview provides the basis for assessing adaptive governance within the community of study. The specific aspects of adaptive governance as identified above need to be explored with the interviewee.

4. What information inputs are used by this institution in its operation and decision-making? How are these obtained? How secure are information flows? (This will assist in assessing the existence of reflexivity and capacity).

- What data are routinely used (refer back to points made in other parts of the interview)? What level of information is collected by the institution/individual and what data come from secondary sources? Do scientists work for the institution? Does the institution work with scientists in another institution? How is information obtained from them? How often? In what manner or context?
- Is local knowledge used by the institution? Does the institution rely just on scientists for information about the ecosystem? Do stakeholders have input into what policy and governance questions are asked?
- What scientific data modeling does the organization have access to? How does it access this information? What time frame, how frequently?
- If primary data is collected, what is the purpose of collecting this information (to monitor, to diagnose, to manage)? Does that data permit the identification of problems or early warning? Does the collected information provide the organization with a comprehensive picture of potential problems within its mandate?
- Is collected data made available to other organizations? To the public? Is this information relevant to rural communities, and if so, is it accessible to them? How do they know about the data collected by the institution, and how is it accessed?

- Where does the individual/organization get the secondary information he/she needs (agency, contact, informal/formal network of data dissemination)? Are these data public?
- What data are needed that aren't currently available? What data does the individual/institution have difficulty obtaining?
- Does the institution get adequate climate change data? What does it need? What is missing?

5. What resources does the institution have access to, what are its resource constraints, and how does this affect its activities with respect to managing, mediating, and planning for climate variability, hazards and extremes, water-related issues? (This will assist in assessing the existence of capacity).

- How is this organization funded? How secure is this funding? What time horizon does funding encompass?
- Does the organization have the necessary financial and technical resources to carry out its activities? How are further resources sought?

6. Who are the institution's stakeholders, how do stakeholders relate to the institution, and how is their input incorporated into the institution's management and decision-making? (This will assist in assessing the existence of equity).

- Who are the institution's stakeholders? On what basis does the respondent consider them stakeholders? How do the institution and the stakeholders interface? Is there a formal process for soliciting stakeholder input?
- How accessible are decision-makers / planners within the institution to stakeholders? How accessible are the institution's scientists to the stakeholders?
- Has the input of stakeholders ever or changed a decision? How are the interests of various stakeholder groups balanced in routine decisions/management activities and times of conflict? Do some stakeholder groups have more influence than others, and why?
- When and how are non-government actors involved in decision making? Do these actors have the opportunity to influence, significantly change, or make major decisions?
- When confronted by a conflict of stakeholders, how does the institution respond? Is the organization sensitive to the various resources available to the different stakeholders? How does access to resources influence/affect

significant participation of various stakeholder groups? Is the knowledge base of the different stakeholders considered?

- Does the institution facilitate the process of negotiation of the interests of different stakeholders with respect to particular interests?
- Has the institution's relationship to stakeholders changed over time? How and why?
- Are there areas where the relationship with stakeholders could be better? Why? How?

7. To whom and how is the institution accountable? (This will assist in assessing the existence of capacity).

- Are the governance institutions legitimate or supported by the people? Are accountability procedures in existence?
- To whom is the institution accountable? What is the process for this (fiscal accountability, progress reports, elections? Against what is this accountability measured (the institution's mandate, public opinion polls, balanced budget...)?
- How are individuals within the institution accountable (performance reviews from superiors, progress reports)? Does final responsibility rest with any one individual/group of individuals?
- Are responses to climate variability, hazards, and extreme events equitable to all community members?
- Are there established ways to monitor/evaluate the success of particular policies/programs? If yes, to whom are the results of this monitoring/evaluation given?
- What is considered "poor" performance? What are the consequences of this (for the institution, for individuals – decreased funding, less responsibility...)?
- Have there been changes in the institution in response to poor performance? What happened?
- Is the institution's performance public record? How is this information made public?

8. In what networks does this institution operate, and how? (This will assist in assessing the existence of capacity).

- To which organizations do you give direction? From which organizations do you receive direction? Which organizations work within parameters heavily influenced by your institution? How does this work? Do these organizations influence how these parameters are set? Is there a formal process for this? How does this work?
- Which organizations/institutions do you co-manage/collaborate/coordinate with? What is the nature of this collaboration/coordination?
- Vertical and horizontal networks?

8.3 Ethics Approval



OFFICE OF RESEARCH SERVICES

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DATE: December 8, 2011

TO: Margot Hurlbert
 Justice Studies and Sociology and Social Studies

FROM: Dr. Bruce Plouffe
 Chair, Research Ethics Board

Re: **Vulnerability and Adaptation to Climate Extremes in the Americas (VACEA)**
(File #58R1112)

Please be advised that the University of Regina Research Ethics Board has reviewed your proposal and found it to be:

1. APPROVED AS SUBMITTED. Only applicants with this designation have ethical approval to proceed with their research as described in their applications. For research lasting more than one year (Section 1F). **ETHICAL APPROVAL MUST BE RENEWED BY SUBMITTING A BRIEF STATUS REPORT EVERY TWELVE MONTHS.** Approval will be revoked unless a satisfactory status report is received. Any substantive changes in methodology or instrumentation must also be approved prior to their implementation.
2. ACCEPTABLE SUBJECT TO MINOR CHANGES AND PRECAUTIONS (SEE ATTACHED). Changes must be submitted to the REB and approved prior to beginning research. Please submit a supplementary memo addressing the concerns to the Chair of the REB. **** Do not submit a new application.** Once changes are deemed acceptable, ethical approval will be granted.
3. ACCEPTABLE SUBJECT TO CHANGES AND PRECAUTIONS (SEE ATTACHED). Changes must be submitted to the REB and approved prior to beginning research. Please submit a supplementary memo addressing the concerns to the Chair of the REB. **** Do not submit a new application.** Once changes are deemed acceptable, ethical approval will be granted.
4. UNACCEPTABLE AS SUBMITTED. The proposal requires substantial additions or redesign. Please contact the Chair of the REB for advice on how the project proposal might be revised.


 Dr. Bruce Plouffe

** supplementary memo should be forwarded to the Chair of the Research Ethics Board at the Office of Research Services (Research and Innovation Centre, Room 501.2) or by e-mail to research.ethics@uregina.ca

Phone: (306) 585-4775
 Fax: (306) 585-4893
www.uregina.ca/research

8.4 Institutional Charts

8.4.1 Federal Institutions

The following federal institutions have a role in the response to drought and flood.

Chart 1: Federal Institutions

Public safety Canada	Natural Resources Canada (NRCAN)	Prairie Provinces Water Board (PPWB)	Environment Canada	NACIS and Geometrics Group
Cooperates with provincial and territorial governments on emergency response (e.g., National Emergency Response System). Cooperates with emergency management organizations across Canada. Linked to the non-profit Emergency Management College (see above, in this document). Government Operations Centre is housed at PSC	NRCAN cooperates with numerous countries worldwide. Memoranda of Understanding exist with the following VACEA countries (other affiliated countries can be found at http://www.nrcan.gc.ca/earth-sciences/about/international/mou/5061): -Argentina (Direccion Nacional del Servicio Geologico) -Brazil (Fundação Instituto Brasileiro de Geografia e Estatística; The Cooperative Research Centre for Spatial Information) -Chile (National Geological and Mining Service of Chile, Sistema Nacional de Coordinacion de Informacion Territorial)	The Board consists of provincial representatives from Alberta, Saskatchewan, Manitoba and federal representatives from Environment Canada and the AAFC-PFRA to resolve conflicts between upstream uses and downstream needs.	The Canada Water Act calls for joint consultation between the federal and provincial governments in matters relating to water resources. The permanent consultation with organizations at the provincial level is through the Canadian Council of Ministers of the Environment or CCME.	a. One thing that the group is really strong is geometrics...National Agro-climate Information Service and they have got three groups there... maps reporting status and stuff. That is used widely. It is on the web and updated every day.

8.4.2 Provincial Institutions

The following provincial institutions have a role in relation to drought and flood.

Chart 2: Provincial Institutions

Alberta Irrigation Projects Association (AIPA)	Alberta Environment and Sustainable Resource Development (ESRD)	Alberta Emergency Management Agency	Saskatchewan Water Security Agency (WSA)	DEMAG	Provincial EMP	EMO; Sask EMO (Saskatchewan Emergency Management Organizations)
It is associated with water management infrastructure to federal, provincial and local government officials, departments	a. Government of Alberta... have designated lead departments or agencies.. for example if it were a wild fire, our wild fire-fighting subject matter expertise is with Environmental and Sustainable Re-	Alberta Emergency Management Act: Mandates the creation of EMAs across Alberta, but the law has been implemented to greater or lesser extents in different areas	Works with RMs on local flood mitigation and response Partners with research institutions on climate change (e.g., mentions PARC in its 25-year plan)	a. ..Irrigated crop sector does have one representative on that we call it the DEMAG. I have a sneaking suspicion that it is AIPA...	a. The law requires in the Province of Saskatchewan under the Emergency Preparedness Act every municipality must have an emergency plan. in some communities, small towns, small rural	a. At that time the provincial EMO had five staff in the province and there was the director, two officers and a couple of clerical staff.

<p>and agencies, water management stakeholders, its own members, the public and the media.</p>	<p>source Development so they will come in and say okay we have the expertise, we will use your staff. Whereas if it were like a terrorist threat, Justice and Solicitor General Department in Government of Alberta would then be the lead agency</p>				<p>municipalities, the emergency plan is the phone number of the Provincial EMP.</p>	
	<p>b. There is conflict between some community members in the Livingstone Range (NW of Pincher Creek)/Willow Creek areas and the SRD. The SRD is apparently pursuing logging projects in the area, to which some community members are opposed (source: VACEA stakeholder meeting attendee and interview participant).</p>					

8.4.3 Local Institutions

The following local institutions have a role in relation to drought and flood.

Chart 3: Local

Local communities	Corporate involvement	Municipalities
volunteers	volunteers	Emergency Planners

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8.4.4 Non-Governmental Organizations

The following non-governmental organizations were found to have a role in relation to drought.

Chart 4: NGO

<p>Canadian Red Cross/Red Crescent</p>	<p>Offers emergency response services (e.g., food, clothing, lodging, first aid, family reunification) during disasters in Canada and abroad through its Climate Centre. The Centre also engages in education and advocacy about climate change related disasters</p>
<p>Institute for Catastrophic Loss Reduction (ICLR) http://www.iclr.org/</p>	<p>The Institute for Catastrophic Loss Reduction (ICLR) is a world-class centre for multi-disciplinary disaster prevention research and communications. ICLR was established by Canada’s property and casualty (p&c) insurance industry as an independent, not-for-profit research institute affiliated with the University of Western Ontario. Institute staff and research associates are international leaders in wind and seismic engineering, atmospheric science, risk perception, hydrology, economics, geography, health sciences, public policy and a number of other disciplines.</p> <p>In order to help address this impending increase in natural disaster losses, the Institute for Catastrophic Loss Reduction (ICLR) has developed a long-term communications strategy to enhance its messaging. Under a broad theme of “science to action, Canada’s insurers building disaster resilient communities” the strategy is centred around three programs:</p> <ul style="list-style-type: none"> RSVP cities (resilient, sustainable, vibrant and prosperous cities); Designed for safer living (safer design and

	<p>construction of buildings); and</p> <p>Open for Business™ (disaster risk reduction for small business).</p> <p>Working through ICLR, Canada's insurers are the only group in the country providing comprehensive disaster loss prevention advice to homeowners and home builders, as well as to owners of small businesses. Actions have been identified to help homeowners and owners of small business reduce the risk of injury, damage, and interruption of business due to severe wind, hail, earthquakes, flood, wildfire and a number of other hazards. We are also working to promote the construction of disaster resilient homes. ICLR is internationally recognized for its leadership in multi-disciplinary disaster prevention research.</p>
<p>Pegasus Emergency Management Consortium (EMC) Corp.</p> <p>http://www.pegasusemc.com</p>	<p>Pegasus Emergency Management Consortium Corp offers Emergency Planning</p> <ul style="list-style-type: none"> Hazard analysis and review Emergency plan development Response-system development Customized training Customized emergency exercises <p>Emergency and Crisis Management</p> <ul style="list-style-type: none"> Response management Crisis communications <p>Recovery Planning and Response</p>
<p>International Institute for Sustainable Development (IISD)</p> <p>http://www.iisd.org/</p>	<p>The International Institute for Sustainable Development (IISD) is a public policy research institute that has a long history of conducting cutting-edge research into sustainable development.</p> <p>IISD's story began in 1988 when Prime Minister Brian Mulroney announced Canada's plans to establish an international institute dedicated to advancing sustainable development at the United Nations. The idea for the institute was rooted in recommendations by a National Task Force on Environment and Economy (designed as a Canadian response to Our Common Future, also known as the Brundtland Report, by the United Nations</p>

	<p>World Commission on Environment and Development and published in 1987).</p> <p>In 1990, Manitoba's Premier Gary Filmon and Canada's Environment Minister Lucien Bouchard signed the agreement that officially created IISD during the Globe Conference in Vancouver, British Columbia. The institute was originally established under The Canada Corporations Act, Part II as a non-profit corporation guided by an independent, international board of directors. Today, the institute is a non-partisan, charitable organization specializing in policy research, analysis and information exchange. Through its head office in Winnipeg, Manitoba and its branches in Ottawa, Ontario; New York, NY; and Geneva, Switzerland IISD applies human ingenuity to help improve the well being of the world's environment, economy and society.</p> <p>The institute champions global sustainable development through innovation, research and relationships that span the entire world. It is devoted to the ongoing communication of its findings as it engages decision-makers in business, government, non-government organizations and other sectors.</p> <p>As a registered charitable organization in Canada, the institute has 501 (c) (3) status in the U.S. IISD receives core operating support from the Government of Canada, as provided through the Canadian International Development Agency, the International Development Research Centre, and the Province of Manitoba. The institute also receives project funding from numerous governments inside and outside Canada, United Nations agencies, foundations and the private sector.</p>
<p>Canada`s Platform for Disaster Risk Reduction</p>	<p>Yes we engage quite extensively with our international strategic allies and also with a number of NGOs and academics in Canada. So the primary outreach vehicle that we use for that is Canada`s Platform for Disaster Risk Reduction which was established in</p>

	<p>2010 under the auspices of the Hero Framework for Action which was kind of a non-binding agreement among 168 countries under the United Nations Strategy for Disaster Reduction and basically Canada's platform has been recognized by the United Nations as one of the most open and inclusive platforms in the world. So we are kind of consistently referenced as a best practice and the way the platform works is that there is ongoing work, a bunch of different interdisciplinary working groups that happen throughout the year and that platform gets together once annually at an annual national round table for disaster reduction and so it brings everyone together in plenary and includes folks from all levels of government so federal, provincial, municipal, the academic sector, the private sector the S and T sort of government contract and researchers as well as other science and technology practitioners, insurance industry and it is a very open membership model so anybody can apply, anyone from private institutions all the way up to IBM or big multi-national corporations. Anyone is free to participate on any of the working groups based on the working groups own terms of reference. So we see a lot of really interesting things start to play out with all of those different levels of players coming together. (C2; p. 4).</p>
<p>Risk and insurance management society (RIMS) https://www.rims.org/Pages/Default.aspx</p>	<p>Mission, Vision and Goals As the preeminent organization dedicated to advancing the practice of risk management, RIMS, the risk management society™, is a global not-for-profit organization representing more than 3,500 industrial, service, non-profit, charitable and government entities throughout the world. Founded in 1950, RIMS brings networking, professional development and education opportunities to its membership of more than 11,000 risk management professionals who are located in more than 60 countries.</p> <p>Vision RIMS will be the global leader in all aspects</p>

	<p>of risk management.</p> <p>Mission To advance risk management for your organization's success.</p> <p>Goals</p> <ul style="list-style-type: none"> To increase the size and scope of the Society's membership base of risk practitioners. To strengthen the Society's chapter structure. To develop and deliver risk management thought leadership, tools and resources. To increase the Society's influence, advocacy and global profile. To maintain an engaged staff and volunteer leadership, and progressive technologies and operations. <p>Governance RIMS Board of Directors is responsible for reviewing and approving the organization's mission and strategic direction (above). In order to ensure that all conflicts of interest, or the appearance thereof, within the organization and the Board are avoided or appropriately managed through disclosure, recusal, or other means, the Board utilizes a conflict of interest policy. The Board also adheres to a reserve policy to ensure that the organization manages its funds responsibly.</p>
<p>Ontario Risk And Insurance Management Society (ORIMS)</p> <p>http://ontario.rims.org/home</p>	<p>ORIMS is the largest RIMS chapter in Canada. Incorporated in 1960 it has over 330 corporate and 190 Associate members. The chapter strives to be one of the pre-eminent chapters in all of RIMS through its chapter leading newsletter the PULSE and regular professional development activities.</p>
<p>Disaster recovery information exchange (DRIE)</p> <p>http://www.drie.org/</p>	<p>The Disaster Recovery Information Exchange (DRIE), along with its affiliates the Business Continuity Management Information Exchange (BCMIE) and le Réseau d'Échange en Continuité des Opérations (RÉCO-QUÉBEC), is a non-profit association of professionals dedicated to the exchange of information on all aspects of busi-</p>

	<p>ness continuity management, from emergency response to the resumption of business as normal.</p> <p>The Objectives of the Disaster Recovery Information Exchange (DRIE) are</p> <ul style="list-style-type: none"> To provide a forum for the exchange of information among Business Continuity practitioners; To be an authoritative source of information relating to Business Continuity; To promote Business Continuity awareness within the business and government communities; To advance the professional standards of the Business Continuity discipline; and To engage with representatives from commercial, not for profit and government organizations in providing information to support the most effective and efficient Business Continuity schemes for the protection of life, health and safety of individuals, and the protection of the property of organizations and the environment in Canada.
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8.4.5 Federal Institutional linkages

The following chart illustrates some of the interlinkages of the federal institutions responding to flood and drought.

Table 1 (A): Federal Institutional Linkages

Table 1.1 (A): Federal

Name and general purpose	Agriculture and Agri-Food Canada (AAFC)
	<p>http://www.agr.gc.ca</p> <ul style="list-style-type: none"> a) Agriculture and Agri-Food Canada is developing its service in partnership with other federal departments, provincial governments, NGOs and industry groups to provide the best available information, analysis and interpretation of land and water resources to all Canadians; b) Responsible for the promotion of the Agricultural business; c) Contains the Agri-Environmental Services Branch (AESB), into which the former Prairie Farm Rehabilitation Administration (PFRA) was folded.

<p>Main roles and responsibilities: water governance</p>	<p>a) Researches and disseminates information on best practices but has no regulatory program in place in relation to water use or water quality;</p> <p>b) Water-related information and resource programs include: -Drought Watch -Environmental Farm Plans (vary by province) -Farm and Ranch Water Infrastructure programs -National Land and Water Information Service;</p> <p>c) Infrastructure: AAFC operates five gravity flood irrigation projects in Saskatchewan (which are being offloaded and may be transferred to local irrigators in the future). It also operates reservoirs, dams, and diversion works.</p>
<p>Main roles and responsibilities: flood / disaster management</p>	<p>a) Provides information on wet soils management;</p> <p>b) Provides information on maintaining safe water supplies during flood.</p>
<p>Links to other organizations</p>	<p>Water-related links to AAFC are: a. Prairie Provinces Water Board b.Saskatchewan Watershed Authority (on water storage infrastructure)</p> <p>Its Portfolio Partners are: b1. Canadian Dairy Commission (CDC) b2 Canadian Food Inspection Agency (CFIA) b3. Canadian Grain Commission (CGC) b4. Farm Credit Canada (FCC) b5. Farm Products Council of Canada b6. Canada Agricultural Review Tribunal</p>
<p>Instruments mandate and other relevant information</p>	<p>Responsible for the following Acts and Regulations (relevant to water): The Prairie Farm Rehabilitation Act. The Prairie Farm Rehabilitation Act pertains to the provinces of Manitoba, Saskatchewan and Alberta.</p>
<p>Main roles and responsibilities: drought / disaster management</p>	<p>a. Drought Watch gets more I think Environment Canada, Agricultural Canada and maybe NRCan but it may be primarily Agriculture Canada but they use our information along with other information. (C4; p.2).</p>

Table 1.2 (A): Federal

Name and general purpose	Public safety Canada
	<p>www.publicsafety.gc.ca</p> <p>Broad mandate includes responsibility for emergency management, national security, crime prevention, law enforcement policy, and corrections policy.</p> <p>Responsibilities specific to emergency management include developing national policy, response systems, and standards. Focus on disaster mitigation, emergency management, emergency preparedness, recovery, and response.</p>
Main roles and responsibilities: water governance	
Main roles and responsibilities: flood / disaster management	<p>a) Disaster Mitigation:</p> <ul style="list-style-type: none"> • National Disaster Mitigation Strategy • National Platform on Disaster Risk Reduction; <p>b) Emergency Management Planning:</p> <ul style="list-style-type: none"> • Issues the Emergency Management Planning Guide • Conducts All-Hazard Risk Assessments; <p>c) Emergency Preparedness:</p> <ul style="list-style-type: none"> • Joint Emergency Preparedness Program (program offers funding for provinces and territories to create preparedness plans and systems) • Canadian Emergency Management College (not for profit); <p>d) Recovery Assistance:</p> <ul style="list-style-type: none"> • Disaster Financial Assistance Arrangements (DFAA) • Federal Disaster Assistance Initiative (FDAI); <p>e) Runs emergency response programs (e.g., Government Operations Centre, Urban Search and Rescue);</p> <p>f) Other: offers educational courses for municipalities on emergency planning, runs the Canadian Disaster Database.</p>
Links to other organizations	<p>Cooperates with provincial and territorial governments on emergency response (e.g., National Emergency Response System)</p> <p>Cooperates with emergency management organizations across Canada</p> <p>Linked to the non-profit Emergency Management College</p> <p>Government Operations Centre is housed at PSC</p>
Instruments mandate and other relevant information	<p>Develops federal policy for emergency management</p> <p>Responsible to:</p> <ul style="list-style-type: none"> • Emergency Management Act (2007)
Main roles and responsibilities: drought / disaster management	

Table 1.3 (A): Federal

Name and general purpose	Environment Canada
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	<p>www.ec.gc.ca</p> <p>Main Purposes :</p> <ul style="list-style-type: none"> a) Protecting the natural environment; b) Providing weather and meteorological information; c) Environmental research and monitoring; d) Environment Canada is the integrative leader for water resources and is in permanent consultation with the provinces that have the primary responsibility in enforcing laws and regulations; e) It is in charge of issues related to the NAFTA Agreement.
Main roles and responsibilities: water governance	<ul style="list-style-type: none"> a) Establishes water quality and wastewater standards and regulations; b) Provides cleanup funding for water bodies; c) Regulation of metal mines, pulp and paper industry; d) Chemical/toxin regulation and management; e) Addresses interjurisdictional water issues and conflicts; f) Supports provincial initiatives on drought (key areas of federal support: research, technology, planning); g) Environment Canada, in consultation with the provincial ministers of the environment, set the Canadian Environmental Quality Guidelines; h) Investment in the United Nations Environment Program's Global Environment Monitoring System (GEMS) for water.
Main roles and responsibilities: flood / disaster management	<ul style="list-style-type: none"> a) Runs the Climate Change Prediction and Scenarios Program (funding of \$29.8 million provided in 2011) b) Floodplain management: <ul style="list-style-type: none"> • Federal administration of the federal-provincial-territorial Flood Damage Reduction Program (1975). Its purpose is to discourage future flood-vulnerable development; c) Forecasting and Warning: <ul style="list-style-type: none"> • Investment in flood forecast centres, e.g., Saskatchewan's River Forecast Centre, Alberta's River Forecast Centre d) Stormwater management; e) Structural measures (i.e., dams).
Links to other organizations	<p>The Canada Water Act calls for joint consultation between the federal and provincial governments in matters relating to water resources.</p> <p>The permanent consultation with organizations at the provincial level is through the Canadian Council of Ministers of the Environment or CCME.</p> <p>Health Canada is in charge of water quality.</p> <p>Climate Change Secretariat</p> <p>On issues related to NAFTA, ENVC must work with the Department of Foreign Affairs and International Trade.</p>
Instruments mandate and other relevant information	<p>Responsible for the following Acts:</p> <ul style="list-style-type: none"> • Canada Water Act • International Rivers Improvement Act • Department of the Environment Act • Canadian Environmental Protection Act <p>Environment Canada was also involved with the creation of the Canadian Water Quality Guidelines (1987) and the Canadian Environmental Quality Guidelines (1996)</p>
Main roles and responsibilities:	

drought / disaster management	
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Table 1.4 (A): Federal

Name and general purpose	Natural Resources Canada (NRCAN)
	<p>http://www.nrcan.gc.ca</p> <p>The mandate of Natural Resources Canada (NRCAN) includes:</p> <ul style="list-style-type: none"> a) enhancing the responsible development and use of Canada's natural resources and the competitiveness of Canada's natural resources products; b) science, technology, earth sciences expertise and maintenance of a knowledge base on landmass; c) developing policies and programs that enhance the contribution of the natural resources sector to the economy and improve the quality of life for all Canadians; d) conducting innovative science in facilities across Canada to generate ideas and transfer technologies; e) representing Canada at the international level to meet the country's global commitments related to the sustainable development of natural resources.
Main roles and responsibilities: water governance	<p>NRCAN conducts water research with forestry, mining and energy sectors.</p> <p>Two programs that relate to water that are part of Natural Resources Canada are:</p> <ul style="list-style-type: none"> a) Enhancing Resilience to a Changing Climate (to assist communities with adaptation); b) Groundwater Geoscience Program (assesses aquifers and makes information available through the Groundwater Information Network), until 2014; groundwater mapping
Main roles and responsibilities: flood / disaster management	<ul style="list-style-type: none"> a) Monitoring and sensing of natural disasters; website contains information on tsunami preparedness, as well as other natural disasters such as earthquakes, landslides, and storms.
Links to other organizations	<p>NRCAN cooperates with numerous countries worldwide. Memoranda of Understanding exist with the following VACEA countries (other affiliated countries can be found at http://www.nrcan.gc.ca/earth-sciences/about/international/mou/5061):</p> <ul style="list-style-type: none"> -Argentina (Direction National del Servicio Geologico) -Brazil (Fundação Instituto Brasileiro de Geografia e Estatística; The Cooperative Research Centre for Spatial Information) -Chile (National Geological and Mining Service of Chile, Sistema Nacional de Coordinación de Información Territorial)

Instruments mandate and other relevant information	Established in 1994 by the Department of Natural Resources Act Under the Resources and Technical Surveys Act, Natural Resources Canada has broad scientific authority, and conducts natural resources research programs and mapping activities. Responsible for: <ul style="list-style-type: none"> • Arctic Waters Pollution Prevention Act • Various acts pertaining to nuclear energy
Main roles and responsibilities: drought / disaster management	

Table 1.5 (A): Federal

Name and general purpose	Prairie Provinces Water Board (PPWB)
	<p>http://www.ppwb.ca</p> <p>The central task of the PPWB is to administer the Master Agreement on Apportionment, which ensures equitable sharing of eastward flowing interprovincial streams and protects water quality of streams and aquifers.</p> <p>The PPWB monitors water quality and quantity at the 16 PPWB sites.</p>
Main roles and responsibilities: water governance	a) Assists with apportionment and avoidance of interjurisdictional conflicts.
Main roles and responsibilities: flood / disaster management	As part of its activities related to surface water, the PPWB reports emergency and unusual water conditions to local, provincial, or federal authorities using its Contingency Plan for emergency notification.
Links to other organizations	<p>The Board consists of provincial representatives from Alberta, Saskatchewan, Manitoba and federal representatives from Environment Canada and the AAFC-PFRA to resolve conflicts between upstream uses and downstream needs.</p> <p>The Master Agreement on Apportionment (1969), ratified by Canada, Alberta, Saskatchewan and Manitoba, stipulates that Alberta must contribute no less than one half the combined flow from the Red Deer and the South Saskatchewan Rivers.</p>
Instruments mandate and other relevant information	<p>The PPWB was created by the Prairie Provinces Water Board Agreement (1948).</p> <p>The PPWB administers the Master Agreement on Apportionment (1969). See Appendix A.</p>

Main roles and responsibilities: drought / disaster management	
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Table 1.6 (A): Federal

Name and general purpose	NACIS and Geometrics Group
Main roles and responsibilities: water governance	
Main roles and responsibilities: flood / disaster management	a. So I mentioned that in our organization we have no programs but the work that is being done NACIS, Allan Howard's group, so we have this NACIS and geometrics group. So one thing that the group is really strong is geometrics and just because of the [word] stuff we had and so that comes under Sherman Nelson as does NACIS so under NACIS you have got Allan Howard as the manager, National Agro-climate Information Service and they have got three groups there. One is the monitoring and reporting under Patrick Cherneski and that stuff you see everywhere their maps reporting status and stuff. That is used widely. It is on the web and updated every day. Then Harvey Hills group is the group that is doing all of the adaptational climate extremes. They have done a lot of good stuff in terms of the LIR project they have been working on and that is something that maybe those applications flood mitigation stuff, I don't know. They have done a lot of good stuff including the stuff that this VACEA work. (C1; p. 19).
Links to other organizations	
Instruments mandate and other relevant information	
Main roles and responsibilities: drought / disaster management	

Table 1.7 (A): Federal

Name and general purpose	National Agroclimate Information Service (NAIS) http://www.spatialbridge.com/nais/
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Instruments mandate and other relevant information	<p>Is Agriculture and Agri-Foods Canada's (AAFC's) service for providing geospatial products and services in support of the Canadian agricultural industry.</p> <p>The updated NAIS mapping system design demonstrated that, by standardizing on ArcGIS 10 and by using patterns of system and application architectures supported by ArcGIS, AAFC could significantly reduce the costs of maintaining the Agri-Geomatics system and of implementing new applications based on the system.</p>
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Table 1.8 (A): Federal

Name and general purpose	<p>AgriInnovation Program</p> <p>http://www.agr.gc.ca/eng/?id=1354301302625</p>
Instruments mandate and other relevant information	<p>The AgriInnovation Program is a five-year, up to \$698 million initiative under the Growing Forward 2 policy framework. Of this, \$468 million is available for funding projects based on applications from industry. The remaining funds go towards AAFC-led research, development and knowledge transfer activities, as well as program administration, that complement industry-directed initiatives. The program is designed to accelerate the pace of innovation by supporting research and development activities in agri-innovations and facilitating the demonstration, commercialization and/or adoption of innovative products, technologies, processes, practices and services. The aim is to enhance economic growth, productivity, competitiveness, adaptability and sustainability of the Canadian agriculture, agri-food and agri-based products sector and assist in capturing opportunities for the sector in domestic and international markets.</p>

Table 1.9 (A): Federal

Name and general purpose	<p>National Land and Water Information Service (NLWIS) [Please note that the project ended in 2009]</p> <p>http://www.horizons.gc.ca/eng/content/aafe-geomatics-%E2%80%93-national-land-and-water-information-service-nlwis</p>
Links to other organizations	<p>http://www.horizons.gc.ca/eng/content/who-we-are</p> <p>Policy Horizons Canada, also referred to as Horizons, is an organization within the federal public service that conducts strategic foresight on cross-cutting issues that informs public servants today about the possible public policy implications over the next 10-15 years.</p>

	<p>Horizons is committed to building the scanning and strategic foresight capacity across the federal government in order to help meet the future needs of departments and agencies. Through collaborative events, workshops and activities, Horizons bridges people and ideas to co-create knowledge across government and other sectors both in Canada and internationally.</p> <p>Horizons' projects examine emerging changes in society, economy, environment, governance and technology in Canada and abroad.</p> <p>Date modified: 2014-09-02</p>
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Table 1.10 (A): Provincial

Name and general purpose	<p>National Agroclimate Information Service (NAIS)</p> <p>http://www.spatialbridge.com/nais/</p>
	<p>Is Agriculture and Agri-Foods Canada's (AAFC's) service for providing geospatial products and services in support of the Canadian agricultural industry.</p> <p>The updated NAIS mapping system design demonstrated that, by standardizing on ArcGIS 10 and by using patterns of system and application architectures supported by ArcGIS, AAFC could significantly reduce the costs of maintaining the Agri-Geomatics system and of implementing new applications based on the system.</p>

Table 1.11 (A): Provincial

Name and general purpose	<p>The Pacific Agri-Food Research Centre (PARC)</p> <p>http://www.agr.gc.ca/eng/science-and-innovation/research-centres/british-columbia/pacific-agri-food-research-centre-summerland/?id=1180620561099</p>
	<p>Summerland, British Columbia</p> <p>The Pacific Agri-Food Research Centre of Summerland, British Columbia</p> <p>The Pacific Agri-Food Research Centre (PARC) in British Columbia is one of Agriculture and Agri-Food Canada's national network of 19 research centres. The Centre consists of two independent research sites: Agassiz and Summerland. Both locations are Minor Use Pesticide Program sites that improve access to new and effective crop protection tools and technologies.</p> <p>The mission of the PARC Summerland Research Centre is to generate knowledge and technologies to promote sustainable and economically viable production of wholesome foods and novel bioproducts from high-</p>

	<p>value horticultural crops for local, national and international producers and markets. Summerland is the home of the Canadian Plant Virus Collection which consists of freeze-dried and live viruses maintained in perennial plants.</p> <p>Major research is conducted on understanding the linkages between food, nutrition and health, securing and protecting food production, and balancing the activities of agriculture with the goal of a sustainable environment. The focus is on horticultural crops such as grapes and tree fruits.</p> <p>The Centre's areas of core research are aligned with national priorities to help the sector adapt and remain competitive in domestic and global markets. Greater participation in research networks and industry-led partnerships expands the Centre's innovation capacity.</p>
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8.4.6 Federal Institutional linkages by theme

The following chart illustrates the federal institutions by theme. The themes include insurance, institutions and public safety, education and institutional support, actual events of drought and flood, learning processes, and perceptions of risk and climate change.

Table 1 (B): Federal

Table 1.1 (B): Federal

Name and general purpose	Public safety Canada
Insurance	<p>a. Certainly it is one of the areas that has been under discussion. So last week there was a meeting of the federal/provincial/territorial ministers responsible for emergency management and there was some discussion and there should be a press release on Public Safety Canada’s website sort of with the exact wording on it but the discussion was about looking at engaging with the insurance industry more aggressively to try and figure out what the specific issues were that were preventing flooding from becoming insurable in Canada and seeing what role if any makes sense for the different levels of government to play to help rectify those issues. (C2; p. 13).</p>
	<p>b. 20. Well you should ask the people running the Canadian Disaster Database so Public Safety Canada have a couple of staff up there now who can answer questions about exactly how the database was pulled together and again it is still a little bit patched together because 99% of the disaster payments are not made by governments. Most of them are made by private insurance certainly 90% if not 99% so they still have to rely on somebody to get the data for their story. (C9; p. 7).</p>

	c. I am not certain how formal the Public Safety Canada effort has been but there are some of these global efforts trying to get good data. don't have as many people to remember what happened in 1910s. (C9; p. 7).
Institutions & Public safety	a. So I believe what happened and I can't tell you because I didn't see the whole line of communication, is someone from the province sent a request either through the federal council or Public Safety Canada to identify any departments that would have enforcement trained people who could help with the evacuations and they also sent a request for anybody who had any other equipment that could be used like boats and things. So that is how everybody kind of puts up their hand and chips in. (C4; p.10).
Educational & Institutional support	a. 17. No the service that Public Safety Canada provides is really a secretariat service. So we enable the platform to happen but really it is not owned by Public Safety Canada, it is its own entity, so we provide sort of the forum for it to happen, provide some support through Secretariat Services for the different working groups and through the arrangement of the round table but other than the platform, individual working groups kind of are responsible primarily only to their own membership and to the interdisciplinary advisory committee of the platform of which Public Safety Canada has one seat but there are eight seats around the table all equally weighted. (C2; p. 4)
Actual Events & Institutional support (Local, Provincial, and Federal)	a. 17. No the service that Public Safety Canada provides is really a secretariat service. So we enable the platform to happen but really it is not owned by Public Safety Canada, it is its own entity, so we provide sort of the forum for it to happen, provide some support through Secretariat Services for the different working groups and through the arrangement of the round table but other than the platform, individual working groups kind of are responsible primarily only to their own membership and to the interdisciplinary advisory committee of the platform of which Public Safety Canada has one seat but there are eight seats around the table all equally weighted. (C2; p. 4)
	b. federal council also has a member from Public Safety Canada on it and there is connections that are maintained or communication lines that are maintained between the federal departments, the federal council and the emergency response in provinces. (C4; p. 10).
Learning (Processes and dealing with disaster, flood plains, past events).	a. I am not certain how formal the Public Safety Canada effort has been but there are some of these global efforts trying to get good data. If you choose one part of the database and I will try to be careful in my language here, but anyway to some extent has been misused by the climate change community using this Canadian government database. You will find that the number of disasters in there increases every decade and increases very significantly every decade. We have almost no events in the period from 1900 to 1910 but we have more between 1910 and 1920 and even more and I am not convinced that is climate change although some people have suggested that it is and I think that is the way the data are collected and put into the database. We don't have as many people to remember what happened in 1910s. (C9; p. 7).

Risk and Climate change (Perceptions)	a. Yes our federal ministry of environment, our federal counterparts Public Safety Canada, the industry itself, there are some organizations, we are not usually looking at very, very long term trends ourselves, we are more the year to year, season to season, what are we expecting next season because that is the game we are in. We are into what is coming up, what are the threats, what are facing, what communities are we are going to have to help through bad times this spring, this summer or this forest fire season or this winter. (S4; p. 14).
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Table 1.2 (B): Federal

Name and general purpose	Environment Canada
Insurance	
Institutions & Public safety	a. Environment Canada, I mean they call it water survey, but really what the water survey of Canada does is it measures stream flow and discharge like it calculates discharge from surface water. So it is much more of a hydrometric program so measuring the actual flows. (C4; p.1).
	b. Well actually the water I mean if we are looking at water levels there is one hydrometric program for all of Canada and it is based on a series of bilateral agreements between Environment Canada and the provinces.(C4; p.3).
Educational & Institutional support	a. 1. Well I don't think that was Environment Canada. I think Natural Resources Canada gets involved in that. Environment Canada, I mean they call it water survey, but really what the water survey of Canada does is it measures stream flow and discharge like it calculates discharge from surface water. So it is much more of a hydrometric program so measuring the actual flows.
	b. So during the Alberta response to the flooding the federal government was there, certain federal government departments have a role like Oceans and Fisheries and so on and Environment Canada, Transport Canada and so on but as an overall the federal government did not take over, the province did take over in High River because they just didn't have the resources for an event of such a long duration. It exhausted all their people and the people that might have been able to manage it were also victims and that is the difference. (A1; p. 5).

	<p>c. am not now but I was for a while but I am also AFC's member and one of two federal members on the Prairie Provinces Water Board committee on hydrology and so Mike Renouf is the executive director for the trans boundary water unit and he chairs so he is basically the executive director for the Prairie Provinces Water Board and in that role he chairs all of the technical committees which is the committee on hydrology, committee on water quality, committee on ground water and AFC is one of the two federal members on the board. The other is Environment Canada and so we are plugged into all that. So I was aware that this was going on and I know there were some workshops held in Swift Current, Creek Watershed and Old Man Basin. (C1; p. 1)</p>
	<p>d. 41. They seem to get involved through some other granting programs like the Natural Resources Canada does have granting but in terms of a broader I guess model for it, I am not aware of anything no. I hope that with climate change adaptation they would be aware of such things. I mean as an example of a border the national administration NOAH forming what is called a regional integrated buy in investment program and each of those are directed with a federal endowment and supports the kind of work I am talking about where you have some consistent group that is providing statistic climate data to an area and leverages federal science capacity and funding for adaptation projects and monitoring the value in reporting. I don't really see that sort of thing happening here. IV Environment Canada is not doing that? R No I don't think so. IV Well not on the scale that you are talking about. R No and not with any consistency. (C10; p. 6).</p>
Actual Events & Institutional support (Local, Provincial, and Federal)	<p>a. Environment Canada doesn't want to pay engineers; they would rather pay a technician less. (C1; p. 7).</p>
Learning (Processes and dealing with disaster, flood plains, past events).	
Risk and Climate change (Perceptions)	<p>a. Even when you look at climate change, money is given out by the government, you know announced in the budget, Environment Canada only usually gets a tiny slice of it and the bulk of it goes to Natural Resources Canada. (C4; p.7).</p>
	<p>b. Yes our federal ministry of environment, our federal counterparts Public Safety Canada, the industry itself, there are some organizations, we are not usually looking at very, very long term trends ourselves, we are more the year to year, season to season, what are we expecting next season because that is the game we are in. We are into what is coming up, what are the threats, what are facing, what communities are we are going to have to help</p>

	through bad times this spring, this summer or this forest fire season or this winter. (S4; p. 14).
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Table 1.3 (B): Federal

Name and general purpose	Natural Resources Canada (NRCAN)
Insurance	
Institutions & Public safety	a. So the water survey it was my understanding that the federal government a few years ago was conducting a water survey of flood plains, so was that accurate or do you know anything about that? R Well I don't think that was Environment Canada. I think Natural Resources Canada gets involved in that.(C4; p.1).
Educational & Institutional support	a. 1. Well I don't think that was Environment Canada. I think Natural Resources Canada gets involved in that. Environment Canada, I mean they call it water survey, but really what the water survey of Canada does is it measures stream flow and discharge like it calculates discharge from surface water. So it is much more of a hydrometric program so measuring the actual flows.
	b. 41. They seem to get involved through some other granting programs like the Natural Resources Canada does have granting but in terms of a broader I guess model for it, I am not aware of anything no. I hope that with climate change adaptation they would be aware of such things.
Actual Events & Institutional support (Local, Provincial, and Federal)	
Learning (Processes and dealing with disaster, flood plains, past events).	
Risk and Climate change (Perceptions)	a. Even when you look at climate change, money is given out by the government, you know announced in the budget, Environment Canada only usually gets a tiny slice of it and the bulk of it goes to Natural Resources Canada. (C4; p.7).

Table 1.4 (B): Federal

Name and general purpose	Prairie Provinces Water Board (PPWB)
Insurance	
Institutions & Public safety	
Educational & Institutional support	<p>a. IV Okay and that would feed right into the Prairie Provinces Water Board.</p> <p>R Yes it provides for both - the meteorological and the hydrometric programs provide support to all of these water boards and committees because a lot of the planning for water apportionment for instance and water management requires the information from the monitoring sites so meteorological sites for rainfall for instance and we used to do a lot more on evaporation and things and then for the water survey because they have a near real time data base on water levels. (C4; p.1).</p>
	<p>b. 34. So I am actually on the committee on hydrology on the Prairie Provinces Water Board so I was aware of work through that and mainly because of the Old Man Basin stuff that was going on and so I have been kind of sitting in the odd time as an acting board member for the AFC. I am not now but I was for a while but I am also AFC's member and one of two federal members on the Prairie Provinces Water Board committee on hydrology and so Mike Renouf is the executive director for the trans boundary water unit and he chairs so he is basically the executive director for the Prairie Provinces Water Board and in that role he chairs all of the technical committees which is the committee on hydrology, committee on water quality, committee on ground water and AFC is one of the two federal members on the board. The other is Environment Canada and so we are plugged into all that. So I was aware that this was going on and I know there were some workshops held in Swift Current, Creek Watershed and Old Man Basin. (C1; p. 1)</p>
Actual Events & Institutional support (Local, Provincial, and Federal)	
Learning (Processes and dealing with disaster, flood plains, past events).	
Risk and Climate change (Perceptions)	<p>a. So that came to us as the prairie provinces water board and as the committee of hydrologists to figure out how to do that and so we have been struggling with that.(C1; p. 9).</p>

8.4.7 Provincial Institutional Linkages

The following chart illustrates some of the interlinkages of the provincial institutions responding to drought and flood.

Table 2 (A): Provincial

Table 2.1 (A): Provincial

Name and general purpose	Alberta Irrigation Projects Association (AIPA)
	<p>The Alberta Irrigation Projects Association has sought to increase the level of understanding of irrigation's value to the Province of Alberta and to promote progressive water management practices.</p> <p>This is primarily an advocacy organization involved in broader public education regarding the role and benefits of irrigation in southern Alberta.</p> <p>www.aipa.org/home.html</p>
Main roles and responsibilities: water governance	<p>a. The main activities that relate to water:</p> <ol style="list-style-type: none"> 1) Provides legislative, policy & regulatory frameworks governing water management (local, provincial & federal) are conducive to progressive, multiple purpose water management and allow mandated organizations the broadest possible means to manage their resources. 2) Participates in education and outreach, policy development and research activities. 3) Improves understanding of water resources and climate change through conferences 4) Provides up-to-date information about the status and benefits of irrigation. 5) Develops and implements progressive water management practices to the benefit of irrigators, communities, regional economic development opportunities, recreation and the environment.
	<p>b. Discussion around licensing, the 13 districts have an umbrella organization called AIPA, Alberta Irrigation Projects Association, and it was around 2011 or 2012 when there was this talk during a time of severe drought or time of severe shortage yes we have senior licences but it doesn't make sense to be putting water on say low value crops when there are livestock or people that really need the water. So they have sort of made an internal decision and I think a copy is available on the AIPA website and I don't know if it is a bylaw or a declaration that in times of shortage their priority for distributing water is people, livestock and then crops. (A3; p. 7).</p>

Main roles and responsibilities: flood / disaster management	a) Promote progressive water management practices. b) ensures water's wise use and conservation, while at the same time, promoting the benefits of the southern Alberta irrigations infrastructure -- are prime activities of the Association and its members
Links to other organizations	a) It is associated with water management infrastructure to federal, provincial and local government officials, departments and agencies, water management stakeholders, its own members, the public and the media. b) Irrigation Districts and Alberta Environment operations staff and Irrigation District managers maintain frequent communication and co-ordination of water supply management activities during the irrigation season.
Instruments mandate and other relevant information	Directors of the AIPA are based on one director for each 75,000 acres of irrigation assessment or part thereof.
Main roles and responsibilities: drought / disaster management	

Table 2.2 (A): Provincial

Name and general purpose	Alberta Environment and Sustainable Resource Development (ESRD) http://www.srd.alberta.ca/ Formed under Premier Redford as an amalgamation of two departments: Environment & Water, and Sustainable Resource Development. Provides licenses for hunting, fishing, and logging and manages these resources. Conducts approval processes for issuing of surface land dispositions for oil and gas development.
Main roles and responsibilities: water governance	Governs public recreational areas within its purview, including water; engages in fisheries management.
Main roles and responsibilities: flood / disaster management	Engages in wildfire prevention and response.

Links to other organizations	<p>There is conflict between some community members in the Livingstone Range (NW of Pincher Creek)/Willow Creek areas and the SRD. The SRD is apparently pursuing logging projects in the area, to which some community members are opposed (source: VACEA stakeholder meeting attendee and interview participant).</p> <p>Has a communication agreement with the Pincher Creek Emergency Management Agency – it notifies them of any plans to release the Oldman Dam (this was implemented after the flood of 1995, wherein no such notice was given and loss of property and livestock occurred – source: VACEA interview, June 2012)</p>
Instruments mandate and other relevant information	
Main roles and responsibilities: drought / disaster management	

Table 2.3 (A): Provincial

Name and general purpose	Saskatchewan Water Security Agency*
	<p>The WSA is a treasury board crown corporation.</p> <p>*to address the problem of a large number of organizations previously involved in water management, the WSA took over provincial management of all water quality, water quantity, and wastewater in October 2012</p>
Main roles and responsibilities: water governance	<p>“The Water Security Agency leads management of the province's water resources to ensure safe drinking water sources and reliable water supplies for economic, environmental and social benefits for Saskatchewan people” (website, August 2013)</p> <p>Funds local watershed organizations</p> <p>Governs water conservation, infrastructure, data collection, and allocation (will review existing water rights licenses in priority watersheds in 2014, the remainder to be reviewed in 2016)</p>
Main roles and responsibilities: flood / disaster management	<p>a. Currently works with RMs to survey flooded areas and makes recommendations</p> <p>Plans to invest in flood mitigation (e.g., mapping, forecasting, information sharing with the public)</p> <p>Plans to pursue a federal-provincial program for flood mitigation</p> <p>Plans to create a provincial emergency flood response plan</p> <p>Plans to conduct a flood assessment on municipal drinking water facilities</p> <p>Its 25-year plan acknowledges climate change</p>

	<p>b. Plans to develop a coordinated provincial drought response plan that includes monitoring, preparedness, response, and recovery approaches (2014)</p> <p>Plans to develop new regulations for water allocation to help manage water shortages during droughts</p>
Links to other organizations	<p>Works with RMs on local flood mitigation and response</p> <p>Partners with research institutions on climate change (e.g., mentions PARC in its 25-year plan)</p>
Instruments mandate and other relevant information	<p>Governed by a board of directors.</p> <p>In 2012, it issued a 25 year plan for water security, which can be found at: https://www.wsask.ca/About-WSA/25-Year-Water-Security-Plan/</p> <p>The Minister of Environment is also the Minister Responsible for the WSA.</p> <p>Ongoing: working to implement the flood protection and prevention measures established in The Statements of Provincial Interest Regulations into local official community plans and zoning bylaws</p>
Main roles and responsibilities: drought / disaster management	

Table 2.4 (A): Provincial

Name and general purpose	<p>Alberta Emergency Management Agency</p> <p>http://www.aema.alberta.ca/</p>
Main roles and responsibilities: water governance	
Main roles and responsibilities: flood / disaster management	
Links to other organizations	<p>The Alberta Emergency Management Agency (AEMA) leads the coordination, collaboration and co-operation of all organizations involved in the prevention, preparedness and response to disasters and emergencies.</p> <p>This ensures the delivery of vital services during a crisis. These organizations include government, industry, municipalities and first responders.</p> <p>The Alberta Emergency Management Agency is accountable and responsible to [Alberta] government, to Albertans, to their communities</p>

	and to industry for the protection of people, their property and the environment from the effects of emergency events.
Instruments mandate and other relevant information	Alberta Emergency Management Act: Mandates the creation of EMAs across Alberta, but the law has been implemented to greater or lesser extents in different areas – in some areas, it is a secondary role held by EMS personnel), and secondarily by the Municipal Government Act.
Main roles and responsibilities: drought / disaster management	a. On drought the AEMA doesn't typically in my experience get involved in drought because it is not that quick emergent type of emergency.(A3; p. 14).

Table 2.5 (A): Provincial

Name and general purpose	DEMAG
Main roles and responsibilities: water governance	
Main roles and responsibilities: flood / disaster management	
Links to other organizations	
Instruments mandate and other relevant information	
Main roles and responsibilities: drought / disaster management	a. Now we have this thing in the province called the drought and excess moisture advisory group. It is relatively new. It existed in another form but this new form is only a couple of years old and I am not sure if AIPA has seat at that group or not... Yes the irrigated crop sector does have one representative on that we call it the DEMAG. I have a sneaking suspicion that it is AIPA that sits there but I don't know that. (A3; p. 14).

Table 2.6 (A): Provincial

Name and general purpose	Joint Emergency Planning Program (JEPP)

	<p>a. The feds were feeding money into, the Province of Saskatchewan spent I will just say \$1 million a year on emergency preparedness and every dime of it came from the federal government. That is why they spent it because it all was federal government money and they didn't have to kick nothing in.</p> <p>IV And is it now?</p> <p>R I don't know if they are doing it now, my understanding is the JEPP, Joint Emergency Planning Program where the feds kicked 50% funding under certain rules, and you know they had their rules and criteria, so if I had a project say we need the hazmat material so they wouldn't buy a fire truck but they would a trailer. So you bought it and submitted all your stuff to them and they would kick back 50 cents on the dollar. (S7; p. 6).</p>
	<p>http://www.aema.alberta.ca/ps_jepp.cfm</p> <p>The federal government has announced that the original objectives of the Joint Emergency Preparedness Program (JEPP), namely to enhance local emergency preparedness and response capacity, have been met and that funding will no longer be available after Fiscal Year 2012/13. Federal contributions for funding provided under JEPP for Urban Search and Rescue and for critical infrastructure initiatives will also cease. Applications for JEPP funding for Fiscal Year 2012/13 projects will still be processed.</p> <p>“We would like to thank Public Safety Canada for their contributions to the program over the years, in particular the 2011/12 and 2012/13 years. Many communities throughout Alberta are better prepared to deal with emergency situations because of the contributions they received through JEPP”.</p>
Main roles and responsibilities: water governance	
Main roles and responsibilities: flood / disaster management	a. Joint Emergency Preparedness Program (program offers funding for provinces and territories to create preparedness plans and systems)
Links to other organizations	
Instruments mandate and other relevant information	<p>Further information about JEPP can be found through the Saskatchewan Ministry of Corrections, Public Safety and Policing – Protection and Emergency Services Branch</p> <p>http://www.cpsp.gov.sk.ca/ProtectionandEmergencyServices</p>
Main roles and responsibilities: drought / disaster management	

Table 2.7 (A): Provincial

Name and general purpose	Irrigation Rehabilitation Program (IRP) . Government of Alberta http://www.agric.gov.ab.ca/app21/in-fopage?cat1=Soil%2FWater%2FAir&cat2=Irrigation
	a. The provincial government introduced the Irrigation Rehabilitation Program (IRP) to increase the efficiency and effectiveness of Water use within irrigation districts.
Main roles and responsibilities: water governance	
Main roles and responsibilities: flood / disaster management	
Links to other organizations	<p>The Ministry of Agriculture and Rural Development contributes to three of the government's four key opportunities. Unleashing Innovation, Competing in a Global Marketplace and Making Alberta the Best Place to Live, Work and Visit. The primary focus of Alberta Agriculture and Rural Development is on Government of Alberta Goal 1, Alberta will have a diversified and prosperous economy under the key opportunity of Unleashing Innovation. The Ministry achieves this by working with others to promote prosperity for Alberta through a strong, competitive, sustainable agriculture and food industry.</p> <p>Ministry Core Businesses</p> <ul style="list-style-type: none"> A market-driven, environmentally responsible industry Food safety, plant health, and animal health and welfare Rural development <p>The Ministry is divided into the Department of Agriculture and Rural Development and a number of agencies, boards and commissions. The Department is responsible for the management of programs designed to facilitate the development of all components of the agriculture and food industry, to sustain the natural resource base of the industry and to encourage the development of rural communities.</p> <p>This information published to the web on July 17, 2009. Last Reviewed/Revised on November 7, 2012.</p>
Instruments mandate and other relevant information	
Main roles and responsibilities: drought / disaster management	

Table 2.8 (A): Provincial

Name and general purpose	Alberta Irrigation Projects (AIPA) http://www.aipa.ca/
	<p>Since 1946... since its incorporation, the Alberta Irrigation Projects Association has sought to increase the level of understanding of irrigation's value to the Province of Alberta and to promote progressive water management practices. Water is vital to life, the environment and the social and economic well-being of communities. Ensuring water's wise use and conservation, while at the same time, promoting the benefits of the southern Alberta irrigations infrastructure — are prime activities of the Association and its members.</p> <p>With its headquarters in Lethbridge, Alberta Irrigation is actively engaged in a number of significant research, policy, governance issues and in providing public education and outreach activities. The AIPA is assisted in its mandate by its staff and the direct involvement in projects and initiatives by its members and project partners.</p> <p>Governance Having the right tools and mechanisms to allow for progressive and adaptive management means it is important to monitor and participate in the review of legislation, regulation and policy.</p> <p>Legislative, policy & regulatory frameworks governing water management [local, provincial & federal] are conducive to progressive, multiple purpose water management and allow mandated organizations the broadest possible means to manage their resources.</p>

8.4.8 Provincial Institutional Linkages

The following chart illustrates some of the key themes that arose in the provincial interviews surrounding insurance, learning processes, risk and climate change perceptions,

education and institutional support, response to actual events and institutions and public safety.

Table 2 (B): Provincial

Table 2.1 (B): Provincial

Name and general purpose	Alberta Irrigation Projects Association (AIPA)
Insurance	
Institutions & Public safety	<p>a. They are kind of an umbrella group of the irrigation districts so a lot of times it is up to them to pull everybody together but again as far as decision making goes, Alberta Irrigation Projects Association, are just like a WPAC.</p> <p>IV What is a WPAC?</p> <p>R A water group. They have no vote, they have no say but they are an overarching umbrella that kind of directs and tries to move the districts in a particular direction because each district has their own water licence, each district has their own infrastructure, Alberta Irrigation Projects Association is just an umbrella group of whole bunch of individuals. (A4; p. 10).</p>
	<p>b. discussion around licensing, the 13 districts have an umbrella organization called AIPA, Alberta Irrigation Projects Association, and it was around 2011 or 2012 when there was this talk during a time of severe drought or time of severe shortage yes we have senior licences but it doesn't make sense to be putting water on say low value crops when there are livestock or people that really need the water.(A3; p. 7).</p>
Educational & Institutional support	<p>a. They are kind of an umbrella group of the irrigation districts so a lot of times it is up to them to pull everybody together but again as far as decision making goes, Alberta Irrigation Projects Association, are just like a WPAC.</p> <p>IV What is a WPAC?</p> <p>R A water group. They have no vote, they have no say but they are an overarching umbrella that kind of directs and tries to move the districts in a particular direction because each district has their own water licence, each district has their own infrastructure, Alberta Irrigation Projects Association is just an umbrella group of whole bunch of individuals. (A4; p. 10).</p>
Actual Events & Institutional support (Local, Provincial, and Federal)	
Learning (Processes and dealing with disaster, flood plains, past events).	
Risk and Climate change (Perceptions)	

Table 2.2 (B): Provincial

Name and general purpose	Saskatchewan Water Security Agency
Insurance	
Institutions & Public safety	
Educational & Institutional support	
Actual Events & Institutional support (Local, Provincial, and Federal)	a. So right now there are different standards in each province because it is a provincial responsibility like in Saskatchewan for example they use a 1 in 500 standard, so one chance in 500 or .2% chance that anyone near flooding is the standard. So any new development has to be built upon the 1 in 500 flood line in Saskatchewan. The new ones are so they have got to go through community development or whatever that department is called so they will go and one of the requirements is that they will go to the Water Security Agency and it is what they call safe building elevation. Well the safe building elevation in Saskatchewan is 1 in 500 plus a half of a meter in elevation and so they all have to be above that or they won't let them proceed with development.
Learning (Processes and dealing with disaster, flood plains, past events).	
Risk and Climate change (Perceptions)	

Table 2.3 (B): Provincial

Name and general purpose	Alberta Emergency Management Agency
Insurance	
Institutions & Public safety	a. we are Alberta Emergency Management Agency, we are part of the Government of Alberta and we are not an independent agency. The agency name is a bit of a misnomer but we are part of the Government of Alberta proper within our agency and with public safety initiatives which is more I would say along the policy and some of the corporate functions. So my job is Manager of Strategic Initiatives which really I am fairly new to. I have only been here a couple of years and up to now the main focus of my work has been on introducing, similar actually to what Saskatchewan has, is a 911 Act but my next project and we had thought about doing this even before the flood, is updating our Emergency Management Act which is the Act which governs three things. The Act itself sets out the emergency powers or the extraordinary powers that the municipality or the province may have and the conditions of exercising that and it has also got one regulation which sets out what our agency does so our main responsibilities and it sets out what the other departments needed to the government of Alberta, their

	<p>roles and responsibilities for emergency management and the second one is the disaster recovery regulation which talks about how the government of Alberta's disaster relief fund works. So we had just sent in a request to update and do a consultation update on the act and those regulations and it didn't even get up the full food chain and the floods hit. So it is certainly going to be a much different review this time because we have never done some of the things that we have done before. We have never exercised certain parts of the act which we did this time. We were really in some uncharted waters so it is going to be very interesting to hear the review of the incident. (A2; p. 1).</p>
Educational & Institutional support	
Actual Events & Institutional support (Local, Provincial, and Federal)	
Learning (Processes and dealing with disaster, flood plains, past events)	
Risk and Climate change (Perceptions)	

Table 2.4 (B): Provincial

Name and general purpose	Environmental and Sustainable Resource Development (Government of Alberta, designated lead departments or agencies)
Insurance	
Institutions & Public safety	
Educational & Institutional support	
Actual Events & Institutional support (Local, Provincial, and Federal)	<p>a. we have certain plans but within the Government of Alberta we have designated lead departments or agencies. So for example if it were a wild fire, our wild firefighting subject matter expertise is with Environmental and Sustainable Resource Development so they will come in and say okay we have the expertise, we will use your staff and your command structure and all of the stuff, but we are lead. Whereas if it were like a terrorist threat, Justice and Solicitor</p>

	General Department in Government of Alberta would then be the lead agency and we serve the same function for them.
Learning (Processes and dealing with disaster, flood plains, past events)	
Risk and Climate change (Perceptions)	

Table 2.5 (B): Provincial

Name and general purpose	Provincial EMP
Insurance	
Institutions & Public safety	
Educational & Institutional support	
Actual Events & Institutional support (Local, Provincial, and Federal)	a. The law requires you in the Province of Saskatchewan under the Emergency Preparedness Act every municipality must have an emergency plan. I know for a fact in some communities, small towns, small rural municipalities, the emergency plan is the phone number of the Provincial EMP written on a wall. That is their emergency plan and I have been told that. What do you do if you have an emergency? Phone them. (S7; p. 2).
Learning (Processes and dealing with disaster, flood plains, past events).	
Risk and Climate change (Perceptions)	

Table 2.6 (B): Provincial

Name and general purpose	EMO; Sask EMO (Saskatchewan Emergency Management Organizations)
	<p>a. At that time the provincial EMO had five staff in the province and there was the director, two officers and a couple of clerical staff.</p> <p>IV Who funded them?</p> <p>R At that time they came under the municipal government, the department or Ministry of Municipal Government. They are now separate. Municipal Affairs is what they were called back in those days.</p> <p>IV So now they are not part of the government?</p> <p>R Oh no they are part of the government but not part of Municipal Affairs. They are separate now under Corrections and Public Safety and that was a big move that needed to be made because what happens is emergency preparedness and the same thing occurred in the City of Regina, emergency preparedness the law required them to have an emergency plan and an emergency planning coordinator. I am going to jump all over the place here. I met the emergency planning coordinator for the City of Regina for the first time in about 1980 and at that time I was heading up the police bomb squad and the police department at that time was looking at gosh maybe we should have some better planning. (S7; p. 3).</p>
Insurance	
Institutions & Public safety	
Educational & Institutional support	
Actual Events & Institutional support (Local, Provincial, and Federal)	<p>a. So they know how to do it better in terms of dispersing support, persons, equipment, having equipment available at hand, in storage, dispersing it, educating local EMO officers and that was observed by many people this time when they started talking in March early April about a significant flood similar to 2011 communities knew what to do and with our emergency response program they knew what to ask for and so communities took action and took action on their own clearing snow out of drainage ditches and acquiring sandbags. (S2; p. 3).</p>
Learning (Processes and dealing with disaster, flood plains, past events)	

Risk and Climate change (Perceptions)	
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8.4.9 Non-Governmental Organizational Institutional Linkages

Table 3: NGO's

Table 3.1 (A): NGO's

Name and general purpose	Canadian Red Cross/Red Crescent
http://www.redcross.ca/	An organization offering emergency assistance in Canada and internationally. Areas of focus include (amongst many others) disaster management, water safety education, emergency health services, and migrant and refugee services.
Main roles and responsibilities: water governance	Offers emergency response services (e.g., food, clothing, lodging, first aid, family reunification) during disasters in Canada and abroad through its Climate Centre. The Centre also engages in education and advocacy about climate change related disasters.
Main roles and responsibilities: flood / disaster management	
Links to other organizations	
Instruments mandate and other relevant information	
Main roles and responsibilities: drought / disaster management	

Table 3.1 (B): NGO's

Name and general purpose	Canadian Red Cross/Red Crescent
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Insurance	
Institutions & Public safety	
Educational & Institutional support	a. Right well I suppose those services are always available outside of what the Red Cross does. If people wanted to access mental health services within the health district they should be available I would think but in terms of our formal process is what I can speak to is there is recognition that people are traumatized early on and that you need to have that intervention or that support earlier. (S1; p.5).
	b. I think generally communities come back to that sort of pre-event state generally speaking. I think they have the ability to come back to that state. So one of the things that I can maybe elaborate on is I think part of being able to do that is government support programs that are there but one of the things that we did here at the Red Cross is the community project grants.(S1; p.12).
	c. Well I had the opportunity to volunteer for some major events in the United States through the American Red Cross so I am very well aware of how they respond. The Canadian Red Cross is far, far, from being. They would love to be that but they are far, far from being there and I used to work for the Canadian Red Cross a long, long time ago as well so I really understand what they are about and what they are trying to achieve. You are right they are much more well-known in the international communities and for some reason and I don't know why, it is has just not got hold in Canada. They have their one thing that they do which is registration party of family in case of disasters and they have always had that role and during the Manitoba floods of 1997 you know they had a very big role in that but it was that piece. It wasn't sheltering people; it wasn't providing food like the American Red Cross in emergencies.(S6; p.5).
	d. The Red Cross in Canada is a built in organization, built into the disaster response network. They do reception and inquiry automatically. In a lot of municipalities they are called in and they have the infrastructure, they have the training and they certainly have the horsepower to do what government now doesn't need to do and knows that it will get done well. As an aside I was the President of the Alberta Central and Northern Alberta region of the Canadian Red Cross. So I can talk to that with some confidence. The Red Cross you know the whole notion of teaching, supervising, swimming instructors and blood donations is still a significant part of the Red Cross but the Red Cross has ventured broadly into the whole field of emergency preparedness and in turn emergency response. It does very much like it does in Peru, Chili, Mexico, the Caribbean and any other part of the world. The Red Cross is constant and they will call volunteers to help in disasters. (C7; p. 2)
Actual Events & Institutional support (Local, Provincial, and Federal)	
Learning (Processes and dealing with disaster, flood plains, past events)	

Risk and Climate change (Perceptions)	
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Table 3.2 (A): NGO's

Name and general purpose	Canadian Risks and Hazards Network (CRHNet)
http://www.crhnet.ca/	<p>CRHNet objectives</p> <p>The primary objectives of the CRHNet are to:</p> <ol style="list-style-type: none"> 1. Initiate the development of a Canadian inter-disciplinary and cross-sectoral network of researchers, academics and practitioners to enhance understanding of emergency management in all dimensions and help build Canadian capacity to deal effectively with threats and consequences from all hazards. 2. Create a Canadian annual forum for dialogue focusing on disaster risk reduction and facilitate policy formulation and adoption of best practices in Canada. 3. Provide a Canadian venue to learn from the experiences of other countries by inviting internationally reputed scholars, practitioners, and participants to the Symposium and to share Canadian experience and efforts in disaster reduction. Source (http://www.crhnet.ca/).
	<p>a. Yes I belong to quite a few of those organizations. I am with CRH Net and we are trying to form a network of networks and trying to get everybody to talk to each other. It is something that I have been trying to do for a while. It should be really easy but it is not. (C8; p. 1).</p>

Table 3.2 (B): NGO's

Name and general purpose	Canadian Risk and Hazards Network (CRHNet)
Insurance	

Institutions & Public safety	
Educational & Institutional support	<p>a. For CRH Net there are government people involved because we are trying to bring everybody together. I am on the board of directors of CRH Net and we are trying to create this network of networks so we have got civil servants on our board of directors and have for quite a while. We have people who are emergency managers for the province, federal government people plus academics plus some private people like myself. The activity is different and from ORIMSs has a few risk managers who are risk managers for a government organization, so the last president of ORIMS was I think the risk manager for Von and the risk managers are there from school boards. There will also be risks managers there for Bank of Montreal. So it is not necessarily in that case a giant overlap and you know hand shaking between government and risk management, but there are people in government who participate in ORIMS in order to talk with other risk managers, network and that sort of thing. (C8; p. 3)</p>
Actual Events & Institutional support (Local, Provincial, and Federal)	
Learning (Processes and dealing with disaster, flood plains, past events)	<p>a. Well they are all tied in and there is a strong movement across Canada on resilience which incorporates a lot of the principles and concepts of mitigation and you know the federal government is aware of it; there are always debates on is it really climate change or just part of a cycle and we will get over it. There are a lot of agencies across Canada, the Canadian Risk and Hazard Network, is one area that there is a push and resilience in mitigation and in fact we have got committees that are working on that and Laura Pearce who is with UBC and Royal Rhodes, professor out there chairs a committee on resilience. It is part of the round table on disaster risk reduction and you see that is another program that if the federal government responded to all the discussions and all the requests and issues and established a round table on disaster risk reduction which is similar to the United Nations. They have a similar setup and Canada was a partner at the table there. So then back in Canada the provinces and the CRH Net and then various universities academic lobbied the federal government saying we have to move on this. So there was the first round table probably about four years ago and the federal government brought a lot of people together and put new initiatives including a lot of committees and including the resilience committee that Laurie Pearce works, our chair, and we seem to be doing very well and the next one is coming up in Saskatoon in November. It is tied in with the CRH Net symposium and it seems we are getting a sense that although the federal government supports it and you know there were a lot of people there and people to lead the different sessions, but because of funding they are backing away somewhat. We have nothing concrete on that just that it is harder to get them to come to the table. We want a representative from the federal government on the CRH Net board. She does come but very limited in what she can promise or what she can tell us on what is happening or not happening. So you might want to check that if you go to the CRHNet.ca you should be able to find the website. (A1; p. 9)</p>

Risk and Climate change (Perceptions)	a. Yes I belong to quite a few of those organizations. I am with CRH Net and we are trying to form a network of networks and trying to get everybody to talk to each other. It is something that I have been trying to do for a while. It should be really easy but it is not. (C8; p. 1).
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8.5 Inferences