An Assessment of Social Connections for the Community in High River, AB: A Perspective on Improving Flood Risk Management

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By
Jan Sotocinal
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Abstract

In recent times, issues on uncertainty and complexity seem to plague the field of flood risk management. Drawing from the 2013 floods in southern Alberta, the region has experienced an unprecedented amount of rain which resulted in the overflowing of the Highwood river and becoming a natural disaster. Due to this catastrophic event, this research paper argues that vulnerabilities in the community of High River, AB need to be assessed with an emphasis on the social linkages that bolster community resilience. An examination of the regional and municipal planning frameworks and emergency management systems will provide a background on how flood risk management is currently done. Through Key Informant Interviews (KIIs), an analysis of the social linkages and organizations was carried out to determine underlying vulnerabilities within the community. As such, these methods can inform us of High River’s social capacity and how these may influence vulnerabilities or community resilience. In order to improve decision-making for flood risk management in High River, social learning can be implemented as a way to increase participatory social capacity building towards improving community resilience.
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I. **INTRODUCTION**

On June 19, 2013, heavy rains began pouring over southern Alberta which reached approximately 100 mm (Calgary Herald, 2013). In High River, the Highwood River reached to a level of 1850 cms, within 8.5 hours, while its width stretched to about 35 times its normal size (Town of High River, 2014d). Due to this event, High River experienced a flood that they had never seen before and produced severe and adverse impacts. Some of these include an evacuation of around 13,400 people, damages to businesses and infrastructures and service utilities disruption (Town of High River, 2014d).

Dr. Pomeroy, Canada's research chair in water resources and climate change, has identified that the cause of this devastating flood event is due to the “cold-low”, where the low pressure system remained static in the foothills and Rocky Mountain regions (Rushworth, 2014). Due to the low being trapped on the two high pressure areas, it generated an “upside-down” system and resembled a tropical storm (Scott, 2013; Rushworth, 2014). As moist air travelled from the Gulf of Mexico to the foothills, this produced an unprecedented amount of rain. (Scott, 2013). Exacerbated by snow melt, the floods of 2013 became the most expensive natural disaster in Alberta (Environment Canada, 2013).

Situated in southern Alberta, the town of High River needs to find ways to improve flood risk management as these flood events are becoming complex and unpredictable. Due to a variety of factors that contribute to extreme flooding, the community needs to question whether existing structural measures or systems in place are able to withstand or mitigate future flooding.
In this particular research paper, it is argued that communities that are flood-prone need to be cognizant of the hazards around them and need to identify factors that make them vulnerable to floods. Through this, the community may be able to support community resilience. With this perspective, communities may adapt to the continually changing environment.

Figure 1. Map of High River\(^1\), taken from Calgary Herald (2013)

II. Background Information on the Research

The main premise of this research paper argues that there are inherent vulnerability and resilience factors in the communities that interplay and contribute to these impacts. Although the physical characteristics play a role in a flood event, the severity of these flood events is depended on the social components. As such, this paper aims to assess the

social system in the community and particular emphasis on the social linkages existing in the community. That being said, this paper also argues that although spatial planning may directly influence the vulnerability and resilience factors, the roles of planning in disaster or flood management can be expanded such as public participation or information-sharing.

In order to provide a clearer understanding of the research, this major research paper aims to answer these research questions:

(1) How do the vulnerability and resilience factors in the community influence the social impacts of floods?

(2) How do social linkages influence the social impacts of floods within the community?

(3) What are recommendations to be made in order to improve flood risk management, in relation to planning and management systems?

The following objectives will outline and specify how this major research paper will answer the above questions:

**Objective 1.** To review the concepts of: vulnerability, resilience, social impacts, social capital, social capacity, community resilience.

**Objective 2.** To understand the planning (and/or policy) framework of Alberta’s municipalities and the municipality of High River.

**Objective 3.** To assess the different social linkages within the community, neighbourhood and individuals that influence social impacts.

**Objective 4.** To recommend measures that will improve the flood risk management in High River.

**Research Methodology, Research Design and Limitations**

This research will assess the social impacts of 2013 floods in the form of an examination of social linkages within the municipality of High River, AB. Through an assessment of these social linkages (municipality, NGOs, and individuals), this research
paper will be able to determine the vulnerability and resilience factors within the community. In addition, an examination of the interactions among the regional and municipal planning frameworks and emergency management systems will inform whether these linkages play a role in perpetuating or reducing the vulnerabilities and resilience in the community. Using guided questionnaires, this research will also utilize interviews to help further understand these factors and determine how to better manage flood risks.

With respect to limitations of this study, the research paper will only analyze information that is readily and publicly available on the internet. Information then may not be up-to-date or inaccurate, as some information is not easily accessible to the public. Since this research relies partly on interviews, information and data analysis are thus dependent on the number of respondents, and that is also dependent on time and effort constraints.

**III. Review of Literature**

*Introduction*

In this section, this will review the literature on vulnerability and resilience with respect to the human-nature interaction. In Perry’s chapter *What is a Disaster*, one of the views considers disasters as social phenomenon, where it focused on disasters within the realm of social change. The view of disaster is: (1) social change is isolation from the physical agents and (2) vulnerability as socially constructed (Perry, n.d., p. 10). As Perry (n.d.) points out, Quarantelli focuses on the fact that disasters are indications of vulnerabilities existing in communities. Disasters then expose the vulnerabilities that
linger in our communities. Kelman (2011) notes, “without vulnerability, a disaster cannot happen…” (p.2) Still, there are still contentions to what vulnerability is.

**Vulnerability in Disaster Management and Planning**

Over the years of vulnerability studies, there have been differing perceptions or interpretations of what vulnerability is. In his paper *Vulnerability*, Adger (2006) surveys and reviews the evolving definition of vulnerability, defined by different authors and understood in their respective fields. With that, vulnerability has also been applied to different subsystems and research areas (Gallopin 2006).

Apart from having a myriad of definitions and perspective on the concept of vulnerability, its understanding lies in the interconnectedness of different components within a given systems. Adger (2006) emphasizes the central idea that within vulnerability and resilience research, there exists a “social-ecological” system (SES) that “reflects the idea that human action and social structures are integral to nature…” (Adger, 2006, p. 268). Gallopin (2006) attempts to define Social-Ecological Systems (SES) as “a system that includes societal (human) and ecological (biophysical) subsystems in mutual interaction.” (p. 294)

Both authors posit that in order to examine vulnerability, there needs to be an understanding between the natural and social environments. Gallopin (2006) points out that although one can study individual components in SES, it is the dynamism between social and ecological components that aid in predicting future outcomes. While nature has constant biophysical processes, Adger (2006) argues the social systems have “rules and institutions that mediate human use of resources as well as systems of knowledge and ethics that interpret natural systems from a human perspective.” (p.268). It is then critical
to view vulnerability by establishing the different interactions between the natural and human environments. Wisner et al (2003) suppose that separating natural characteristics from social aspects will be “unhelpful in both understanding disasters and doing something to prevent or mitigate them.” (p.5)

With respect to the progression of the concept of vulnerability, Adger (2006) shows that vulnerability studies evolved into two camps, both of which have different focuses: vulnerability as lack of entitlements and the vulnerability to natural hazards. The former analyzes vulnerability with respect to “the social realm of institutions, well-being and on class, social status and gender” (Adger, 2006, p. 270) while the latter has its emphasis on the “human responses drawing on geographical and psychological perspectives in addition to social parameters of risk.” (Adger, 2006, p. 270)

Though the two approaches may seem interrelated as pointed out by Adger (2006), they are inherent differently. Analysis of vulnerability of entitlements sprung from the necessity of understanding the intricacies of food insecurity, civil strife and the like. On the other hand, the analysis of vulnerability of natural hazards came about due to the similarities in impacts of different natural disasters to society. Both of these approaches aim to establish linkages between the natural and human environment to provide explanations on the different causes of vulnerability. Though it is important to discuss the different angles of vulnerability, the discussion will only focus understanding vulnerability with respect to natural hazards.

That being said, other authors have offered different views of vulnerability pertaining to natural hazards. In Alwang et al (2001)’s section on vulnerability with Disaster Management, they find that vulnerability “is determined, in part, by social
factors.” (p. 19), and goes far as saying that “social vulnerability is itself a combination of social factors and environmental risks.” (p. 19) In their literature review, it supports the idea that disasters are not “acts of God” and that though natural hazards may arise, it is the response of the household and social systems that makes it into a disaster (Alwang et al, 2001).

Cutter et al. (2003) further expounds on the different sources of social vulnerability. In their paper on social vulnerability to natural hazards, Cutter et al (2003), identified three tenets in vulnerability research:

1) identification of conditions that make people or places vulnerable to extreme natural events, an exposure model
2) assumption that vulnerability is a social condition, a measure of societal resistance or resilience to hazards
3) integration of potential exposures and societal resilience with a specific focus on particular places or regions. (p. 242-243)

Cutter et al. (2003)’s explanation of social vulnerability is centered on the fact that vulnerability is influenced by social inequalities and place inequalities. This is to say that vulnerability is characterized by the hazards-of-place model, where social and biophysical vulnerabilities interact to form the place vulnerability (Cutter, 2003). When analyzing vulnerability to natural hazards, Cutter et al (2003) determines that vulnerability is concerned with the potential losses to society.

In such a case, Lewis (2014) supports the view of vulnerability that Cutter et al (2003) provide, where human settlement becomes places-at-risk. Yet, Lewis (2014) proposes to depart from the notion of susceptibility as a secondary definition of vulnerability to treating susceptibility as a separate term. He suggests that vulnerability should be understood as the physical dimension of the place whereas susceptibility should mean as a “weakening of capacity to cope.” (p. 8) This provides the understanding
that the socio-political constructs and processes influences of the place influences susceptibility while the geographic location gives rise to the vulnerability.

On the other hand, Wisner et al (2003) provide that though there is a direct relationship between loss of life and property and natural hazards, “social, economic and political processes” (p.7) contribute to the vulnerability. Consistent with others, Wisner et al (2003) explains that the biophysical components also introduce with socio-economic components that produce disasters. Wisner et al (2003)’s Pressure and Release (PAR) model explains the different aspects of vulnerability that are inherent in the community. Within the PAR model, vulnerability is determined by three factors, all linked into a chain: root causes, dynamic pressures and unsafe conditions. More specifically, root causes are the vulnerability factors that relate to the political and economic systems and their underlying ideologies, whereby power, structures and resources come into play. Dynamic pressures are the factors that “channel the root cause into particular forms of unsafe condition” (Wisner et al, 2003, 54), such as rapid urbanization or deforestation. Unsafe conditions then are the factors generated from the build-up of dynamic pressures. With all these three factors combined, vulnerability is produced that perhaps stem from the socio-political and economic processes.

Throughout the literature on disaster planning and management, vulnerability is a concept that attempts to explain the underlying causes of disasters, with an emphasis on its losses. It is consistent within this brief review of literature on vulnerability that vulnerabilities are caused by the social conditions that interact with the natural world and its attributable risks (Kelman, 2011). As a whole, understanding of vulnerability has
reached no consensus and there are still contentions as to what vulnerability is and what it constitutes.

Varying definitions of vulnerability lends itself to the confusion on what specifically vulnerability means. As Alwang et al (2001) suggest, “vulnerability should be defined with respect to a given risk or risks and to an undesirable outcome.” Vulnerability is then dependent on the type of disaster vulnerability and should be viewed specific to the natural hazard. It is important to note that vulnerability, in general, is specific to the given stress that affects the system (Gallopin, 2006). Although the system may be vulnerable to one kind of stress, the system may not be vulnerable to another stress.

In general, Adger (2006) defines vulnerability as the “degree to which a system is susceptible to and is unable to cope with adverse effects.” (Adger, 2006, p.269) Within this system, the components that affect vulnerability are: the system’s exposure, sensitivity and adaptive capacity in relation to perturbations or stresses, in the form of natural hazards (Adger, 2006). However, this major research paper contends that considerable attention needs to focus on human systems. Therefore, Wisner et al (2003)’s definition of vulnerability will be adopted where they define it as “the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard (an extreme natural event or process)” (p.11). As mentioned before that vulnerability is dependent on the stress on the system, it is then important to explore what vulnerability is in a flood event. The next section will discuss specifically vulnerability to floods.
Vulnerability in Flood Disaster

As presented in the previous section, there have been differing views and interpretations of vulnerability in the disaster planning and management literature. The issue in this case is that there is a lack of consensus as to the constitution of vulnerability, which then translates also into differing concepts of flood vulnerability.

Throughout the literature on flood vulnerability, there have been several attempts to provide a definition what flood vulnerability is, which may prove to be useful it its quantification. Balica et al (2015) consider flood vulnerability as “the extent to which a system is susceptible to floods due to exposure, a perturbation, in conjunction with its ability (or inability) to cope, recover, or basically adapt.” (p.129). This definition of flood vulnerability is dependent mainly on the exposure of society, together with the populations’ susceptibility to the hazard and community resilience (Balica et al, 2015).

Nonetheless, Balica et al (2015) use this definition to calculate a Coastal Cities Flood Vulnerability Index (CCFVI). The formula of this index system is based on the Flood Vulnerability Index (FVI) where the FVI is calculated by: (E * S)/R where E is exposure, S is susceptibility and R is resilience. One thing to note in the calculation of this vulnerability index system is that it considers hydrogeological, social and economic components of the place and takes into account the exposure, susceptibility and resilience of each of these components. Adding these will then form the total CCFVI (Balica et al, 2015).

To construct Integrated Flood Vulnerability Index (IFVI), Sebald (2010) uses the definition of vulnerability as the “state of the system before an event, in our case a flood event, sparks an event” (p.13). Contrary to Balica et al (2015), he considers vulnerability
as a whole and fails to acknowledge any specific components of vulnerability (e.g. exposure, susceptibility and resilience). Despite this, Sebald (2010) separated vulnerability into four parts: Social, Economic, Ecological and Physical. Given by the formula\(^2\) Sebald (2010) uses, it implies that social, economic and ecological vulnerabilities interact with each other. As such, Sebald (2010)’s definition of flood vulnerability is an aggregation of different types of vulnerability in the community.

According to the UNESCO-IHE (n.d.), flood vulnerability is “the extent of harm, which can be expected under certain conditions of exposure, susceptibility and resilience.” UNESCO-IHE calculates flood vulnerability as the difference of the sum of exposure and susceptibility, and resilience. Flood vulnerability factors that flood vulnerability that UNESCO-IHE considers then are: elements-at-risk, characteristics of flood, awareness/preparedness, capability to cope, coping and recovery capacity. Additionally, UNESCO-IHE (n.d.) considers vulnerability in different subsystems that are interdependent with each other: Administrative and Institution Subsystem (AIS), Natural River System (NRS), and Socio-Economic System (SES). Any flood event is perceived to be disruption to these subsystems.

Peck et al (2007) offer a different perspective on flood vulnerability and describes it as the “physical, economic, infrastructure, and social susceptibility or sensitivity to damage from a flood event.” (p.9) Different from UNESCO – IHE (n.d.) and Balica et al (2015), Peck et al (2007) do not include exposure as a function of the vulnerability in its flood risk calculation. Instead, vulnerability is separate from exposure and hazard in

\[\text{IFVI} = \sum (\text{SocVul} + \text{EconVul} + \text{EcolVul}) \times \text{Physical Vul} \]

Where SocVul refers to social vulnerability, EconVul refers to Economic Vulnerability, EcolVul refers to Ecological Vulnerability and Physical Vul refers to physical flood factors.
risk determination. To conduct vulnerability assessment to floods is to ascertain elements-at-risks for each descriptor (physical, economic, infrastructure, social). On the other hand, the exposure component is concerned with the physical impacts of floods and is only determined by land-use and soil permeability (Peck et al, 2007).

Muller et al (2011) adopt the definition of flood vulnerability as “results from the social and physical conditions that make parts of an urban system susceptible to experience damage from a flood event.” (p.2108). The way Muller et al (2011) approach flood vulnerability assessment is different compared to the previous authors, in that, it only focused on the physical and social vulnerabilities. They suppose however that “socio-economic characteristics are not sufficient for explaining different levels of vulnerability.” (Muller et al, 2011, p.2121) This implies that there should be a concentration on integration of different dimensions of the community to provide a holistic view of flood vulnerability.

Fedeski and Gwilliam (2007) do not necessarily adopt a definitive term of vulnerability as this was adapted from Crichton’s risk triangle, where vulnerability is part of the risk function. The application of vulnerability also is only on the built environment where vulnerability is perceived to be “the susceptibility of the building to the hazard were it to occur.” (p.51) Building vulnerability is only part of the building damage function, together with flood severity (Fedeski and Gwilliam, 2007). Therefore, flood vulnerability is only confined to a function of a built environment which does not include other facets of the human environment, such as the economic activities or social processes.
Lee et al (2013) suggest that “the concept of vulnerability expresses the multidimensionality of disasters by focusing attention on the totality of relationships in a given social situation.” (p.1293) In this regard, Lee et al (2013) used the Pressure-State-Impact-Response) PSIR framework (as recommended by the European Environment Agency (1995)). The social, economic and environmental components were examined and were subjected to the PSIR framework where it determined vulnerability as an aggregate of these things.

Scheuer et al (2011) define flood vulnerability as “the characteristics of a system that describe its potential to be harmed.” (p.733) With this view of flood vulnerability, Scheuer et al (2011) do not necessarily provide a distinction between risk and vulnerability, where they expressed vulnerability in terms of “expected damages regarding all elements of risk” (p.733) These were referred as risk criteria. In addition, coping capacity is separated from vulnerability, where coping capacities are considered to be ways in which resources are used throughout the flood cycle to cope with the attributed adverse impacts (Scheuer et al, 2011). One of the key things that the authors highlight is that they used the terms “starting point view” which excludes coping capacities and “end point view” which includes coping capacities into the equation (Scheuer et al, 2011).

As far as quantifying flood vulnerability however, authors still imply that the majority of vulnerability is measured through economics. In her paper Long Term Social and Economic Impacts of Extreme Floods, Gruntfest (1995) cites that dealing with economic measurements, as traditional measurements, are challenging but compared to estimating individual and societal impacts, they are easier to use. Additionally, Balica et
al (2015) point out that the main tool by which society use to measure its vulnerability is through economic losses. Furthermore, Wickes et al (2015) provide that economic vulnerability is “considered the most significant threat to community resilience following a disaster event” (p.332) which implies that impacts to the economy are seen as the main indicators. These show that majority of vulnerability research in floods is predominantly quantified through economics.

Schmidt-Thome et al (2006) explain that economic growth as a direct relationship with economic vulnerability. This means that if there is more growth in the economy, the more vulnerable it becomes economically. For instance, as a city develop more in the floodplains which may explain the large economic growth, the more vulnerable the city becomes (Balica et al, 2015). Thus, the exposure to the natural disaster hazards may explain the relationship between economic wealth (Schumacher and Strobl, 2011).

There is no doubt that economic vulnerability can explain the linkages between economic impacts of natural disasters and economic development, but it does not necessarily explain the societal impacts of floods. None of the economic losses can describe the impacts to society in its entirety. To isolate economic vulnerability as the only determining factor in building resistance from floods is not necessarily a good measure of impacts on the community.

In flood vulnerability literature, it shows that there are still varying assumptions as to what flood vulnerability really is and what it constitutes. There has been generally a focus on the physical aspects of flooding but the body of literature has greater consensus on an integration of different aspects of flood vulnerability namely: social, ecological, physical, economic. Though the body of literature does provide a further understanding
on consolidating different aspects of flood vulnerability, there has been a lack of concentration on the social impacts on the community. It is important to take note of these as they contribute to the vulnerability on society.

Oliver-Smith (2009) argues that the “concept of vulnerability challenges us to identify those social features and specify those linkages to processes that when coinciding with the onset of a hazard lead to damages and deaths.” (p.16) In order to improve flood vulnerability assessment then, considerable focus and in-depth analysis must be directed to the societal aspects and dynamics of the community but in conjunction with the economic dimensions and biophysical environment. Through social impacts then, vulnerability can be understood closely. The next section will then discuss the social impacts of floods and how it relates to vulnerability.

**Social Impacts**

Social impacts are described “as impacts on people and communities other than those that operate via the dollar in their wallets.” (Mack, 1974, p.175). Within these impacts there are three kinds of social impacts that Mack (1974) identified:

1. impacts that are broadly personal and typically immaterial, such as enjoyment of beauty, of personal or social relationships, of good health, etc. elements included in the system of accounts for social being

2. impacts that are functions of environmental quality in the sense that a well-maintained lake or stream affords a larger yield of swimming, fishing, or canoeing pleasure than a poorer quality

3. distributional aspects of economic development in so far as the utility generated by a dollar of economic advantage for a poor man is greater than that for a rich man (p.175)

Similarly, United States Army Corps of Engineers (USACE) considers the social impacts to be “Other Social Effects”, along with National Economic Development (NED,
Regional Economic Development (RED) and Environmental Benefits (ENV), as part of the components or accounts to be assessed in project analysis and decision making, as stated in “Planning in a Collaborative Environment (2005)” (Berginnis, 2008; Durden and Wegner-Johnson, 2013). Other Social Effects (OSEs) are important in describing the “social life in the local and regional areas.” (Laska et al, 2008, p.2), though it has been challenging to measure these OSEs.

Durden and Dunning (2007) of the USACE define social effects as “how the constituents of life that influence personal and group definitions of satisfaction, wellbeing, and happiness are affected by some condition or proposed intervention.” (p.2) This definition of social effects is an attempt to consider and include social well-being for water resource planning that were once ignored as in the past project assessment focused heavily on the NED analysis (Durden and Dunning, 2007).

The key to understanding on OSEs is based on three concepts, all of which pertain to well-being: human needs theory, social connectedness and social vulnerability (Durden and Dunning, 2007). Human Needs Theory is based on Maslow’s hierarchy of needs: once the physiological needs have been satisfied, one pursues to reach other needs such as “safety, love/belonging, status, and actualization.” (Durden and Dunning, 2007, p.2) Social connectedness is termed as a web of “social network within which individual interact, which largely provides meaning and structure to life.” (Durden and Dunning, 2007, p.5) With respect to social vulnerability is defined by “the capacity for being damaged or negatively affected by hazards or impacts.” (Durden and Dunning, 2007, p.5) These concepts provide the different perspectives on the composition of well-being.
In a more recent document, a primer presented by the Institute for Water Resources (IWR) of the USACE, Durden and Wegner-Johnson (2013) provide the human needs dimensions according to the Human Needs theory. The Human Needs theory supposes that “people must have a number of essentials to survive and thrive.” (Dunning and Durden, 2007, p.2). Based on this primer, key OSE human needs dimensions identified are (Durden and Wegner-Johnson, 2007):

- Health and Safety
- Social Vulnerability and Resilience
- Economic Vitality
- Social Connectedness
- Identity
- Participation
- Leisure and Recreation (p.4)

Overall, the intent of identifying these OSE is to promote a complete problem scope and objectives that consider various social impacts of the project into the decision-making realm (Durden and Wegner-Johnson, 2007).

At times, these social impacts do not have defined spatial and temporal boundaries so it is important then to plan for uncertainty (Merz et al, 2010). When a flood happens, the disaster site can and will cross jurisdictional boundaries and its impacts can range from short-term to long-term.

It is important then to be aware of how impacts should not only be limited to economic impacts on society. As such, this led the USACE to review the OSEs lists used to assess proposed or existing projects due to the levee failures from Hurricane Katrina and Rita and proposition of new OSEs (Laska et al, 2008). Through the process of Social Impact Assessment, different factors were included and related to “social resiliency, social well-being and social/community capital.” (Laska et al, 2008, p.4). Through this,
the revised list will hope to provide a broader scale of assessment in water resource planning (Laska et al, 2008).

Assessments of flood impacts should also include other aspects of society as well. As shown above, social impacts or OSEs are not only limited to the deaths or health effects and there are other factors that decision-makers or policy-makers should consider in planning and management of flood risks. For one, floods can affect social connectedness and may affect vulnerability.

**Social capital and social capacity**

In order to improve the state of social impact assessment or vulnerability assessment to floods, this research paper argues that considerable attention should then be paid to social cohesion, connectedness and the like – *social capital* as authors may call it. Light describes social capital to be “relationships of trust embedded in social networks” and differentiates it from human capital and cultural capital (Putnam et al, 2004, p.146). He argues that it is the mutual relationship of reliance among individual or group that create the social capital. Light suppose that social capital can be morphed into other forms of capitals such as human, cultural, or even financial capital (Putnam et al, 2004).

The concept of social capital has different forms: bonding, bridging, and linking (Putnam et al, 2004). Vidal points out that the bonding social capital is the form that brings people who are familiar with each other closer while the bridging social capital is the form that relates to people who have not previously known each other. Woolcock provides that linking social capital applies to the people’s relations to authority (Putnam et al, 2004). Overall, social capital can be anything that relates to linking people as an individual and a collective, with *mutual trust* (Putnam et al, 2004, p.147).
Within the social capital literature, there are also two kinds of social capital: structural and cognitive (Sherrieb et al, 2010). Structural social capital “refers to forms and varieties of social organizations and networks that are thought to contribute to the development of social capital” (Sherrieb et al, 2010, p. 233), while cognitive social capital refers to the “mental processes and perceptions resulting from norms, values, attitudes and beliefs that foster mutually cooperative behaviors.” (Sherrieb et al, 2010, p.234).

Being used in economics and other social science fields, there is much contestation on what social capital is. To simplify, Mauerhofer (2013) suggests the definition of social capital as:

(a) a social asset with the character of either stock/source or sink at a certain time, and

(b) quantitatively and qualitatively characterized through an adequate number of humans or a human being alone and through already genetically predetermined and/or in another way capacitated characteristics (such as measurements, skills, interests) (p. 68)

In such a case, Mauerhofer (2013) offers this in order to separate it from social capacity, as authors tend to interchange the two terms. For this matter then, Mauerhoer (2013) defines social capacity as the outcome of social capital, where it is the:

growth or development of each hierarchical level of human or social integration within a certain spatial range, shaped by unilateral, multilateral, reflexive and/or interdependent processes within an individual and between individuals or group of individuals within a certain period. (p.69)

With much specificity, Lichterman (2009) suppose that social capacity “is people’s ability to act as mutually responsible citizens in organizing public relationships rather than leaving those relationships entirely under direction of either impersonal
market mechanisms or administrative fiats of the state.” (p.847). The kind of social capacity that Lichterman (2009) describes is the process that forms linkages in a civic society (e.g. church, faith-based organizations, not for profit etc.) in isolation from economic or government factors.

In this regard however, the definition of social capacity which best frames this major research paper (Kuhlicke et al, 2011):

is the context-related ability to decide and to behave successfully in a certain situation in order to anticipate, respond to, cope with, recover from or adapt to the negative impacts of an external stressor (e.g. a hazardous event) as well as to employ the necessary resources. (p.807)

Kuhlicke et al (2011) outlined the different types of social capacities, namely:

- knowledge capacities – e.g. knowledge on hazard and risk
- motivational capacities- e.g. motivation to cope from adverse impacts of hazards
- network capacities- e.g. possession and use of social capital, establishment of trustful relationships
- economic capacities- e.g. access to financial resources
- institutional capacities- e.g. fair governance, multi-stakeholder
- procedural capacities- e.g. able to obtain these social capacities (p.806)

Social capacity helps us understand the different linkages, or lack thereof, that may give rise to vulnerabilities. Kuhlicke et al (2011) insinuates it is important to acquire a deeper “understanding of what kind of capacities are lacking or existing in relation to natural hazards.” (p.808). Werg et al (2013) agrees that having a deeper understanding of the lack of capacities within communities is the first step to rebuilding social capacity and reducing vulnerabilities. Therefore, evaluating the kinds of social capacity that exists in the community may inform of their underlying vulnerabilities.
Community Resilience

Since one of the goals of research is to determine ways of increase resilience, the concept of resilience needs to be revisited again. The myriad view and conception of vulnerability also lends itself to resilience, to which no consensus has been met (Kelman, 2011). The concept of resilience has its beginnings in ecology and natural sciences, but has been widely used in different fields (White and O’Hare, 2014). In this particular research paper, resilience will be discussed and reviewed to determine its relationship with vulnerability. This will then produce a perspective that would be well-suited for resilience building with respects to natural hazards.

Gunderson (2010) cites that resilience originated from the ecological and natural sciences and typifies resilience as the “capacity to rebound and recover after a shock or an event.” (p.2). He cites Holling’s term of ecological resilience where there are two views of resilience: (1) the view in which the system returns back to its previous state and (2) the view in which the system changes to state different from its previous state (Gunderson, 2010). Apart from ecological resilience, Gunderson (2010) also provides that there also exists a community or urban resilience. This term is defined as the capacity of a city to bounce back from disasters, where it involves changes that influence a community in terms of its “structures, processes and identities” (p.3) into an ideal or un-ideal state.

Through this, Gunderson (2010) explains that elimination of key roles in disaster management can give rise to vulnerabilities and lead to outcomes that are less desirable, leading to lowered resilience. Same as in the ecological system, Gunderson (2010) points
out that diversity can play a significant role in increasing resilience with the premise that “diversity helps a system more quickly return to its pre-disturbance conditions.” (p.4). In addition, the different activities that connect actors within the system, in time and space dimensions influence the recovery process (Gunderson, 2010). Furthermore, social networks need to be fostered as these create the flow of capital and information that encourage post-disaster recovery (Gunderson, 2010).

As a general term, Holling (2001) typifies resilience as synonymous to the adaptive cycle of the system and aids in the determination of vulnerability. Holling (2001) argues that there exists “panarchies” – a sequence of hierarchical adaptive cycles where the linkages to each cycle determine the sustainability of the system. To simplify what the adaptive cycle, there are four phases in which the system undergoes: release (from conservation to exploitation), reorganization (exploitation to conservation), remembrance (largest/slowest to smaller/fastest) and revolt (creative destruction) (Holling, 2001). These processes create further complex web of process where systems go through and observe transformations within systems. That being said however, human systems are not as easy to examine compared to natural system, due to human foresight and intentionality, communication and technology (Holling, 2001). This makes the assessment of sustainability a complex problem to tackle, and the examination of panarchies not as clear-cut.

In an effort to improve the state of hazard planning, Tobin (1999) argues that to build resilient communities that can withstand the effects of natural hazards, sustainability has a role to play. Though Tobin (1999) does not necessarily define what resilience is, he regards sustainable and resilient communities to be organized in such a
way that it dampens the impact of disasters while able to hastily regain the “socio-economic vitality of the community.” (p. 13)

Due to the complex nature of a globalized community, at times local planning is challenged by the interconnections between society and environment but fails to address these connections which only perpetuate vulnerabilities (Tobin, 1999). Tobin (1999) therefore provides a framework that integrates mitigation, recovery and structural-cognitive models where it generates a community that is well-suited to cope with natural hazards, though dependent on “careful planning and organization of society.” (Tobin, 1999, p. 15) Theoretically, the framework will produce the kind of community that are sustainable and resilient, and characterized by having, as Tobin (1999) suggested:

- Lowered levels of risk to all members through reduced exposure to the geophysical event
- Reduced levels of vulnerability for all members of society
- Planning for sustainability and resilience must be ongoing
- High level of support from responsible agencies and political leaders
- Incorporation of partnerships and cooperation at different governmental levels
- Strengthened networks for independent and interdependent segments of society
- Planning at appropriate scales (p.16)

However, the outcome of a sustainable and resilient community operates on the assumption that the recovery and mitigation models work in cooperation with each other. The framework needs to achieve the same goals and acquire a deeper understanding of factors that influence on the structure-cognitive aspects of the community (Tobin, 1999). However, Tobin (1999) does not consider ‘sustainability’ to be mutually exclusive from ‘resilience’; rather, he proposes that sustainability is needed to become resilient.

Authors also considered other types of resilience. Sherrieb et al (2010) define community resilience as the communities’ potential to recover from stress and depends on four capacities – namely economic development, social capital, information and
communication, and community competence (Sherrieb et al, 2008). Though these four capacities are mentioned, only economic development and social capital are discussed and analyzed in the paper, with respect to community resilience. In the model, economic development is contingent upon the type of economic structure that the community has, together with the kinds of connections and capacities. Resource level, resource diversity and resource diversity also influence the economic development (Sherrieb et al, 2010).

On the other hand, Sherrieb et al (2010) consider social capital to be “a set of adaptive capacities that can support the process of community resilience to maintain and sustain community health.” (p.233). Nonetheless, the model that Sherrieb et al (2010) put forth to measure social capital are: social support, social participation, and community bonds. An important thing to note is that in their paper social capital solely focused on the structural component, and disregarded the cognitive aspects. In order to improve community resilience, Sherrieb et al (2010) argues that establishing and understanding these capacities and inter-linkages between economic development and social capital are needed, especially in establishing links between these capacities to disaster risk.

Wickes et al (2015) regards community resilience as a complex concept that involves a multitude of facets and can only be inspected in times of stress. The same as Sherrieb et al (2010), Wickes et al (2015) adopts the term of community resilience as a process that links capacities to a dynamic goal and encourages adaptations after a perturbation. In such a case, Wickes et al (2015) highlighted that the “structural conditions and the availability of local social capital influence community after the 2011 Brisbane floods.” (p.347). In their examination of the 2011 Brisbane floods, they indicated the importance of social capital in dealing with social problems such as crime
rates though social capital may not necessarily influence the presence of social problems post-flood. Nonetheless, Wickes et al (2015) stress that an examination of organization and social linkages with respect to community well-being is important in determining potential for collective action and addressing social problems.

On Schelfaut et al (2011)’s Freeman project, the concept of resilience is specifically applied to the flood-prone communities where these communities have the ability to minimize, evade or cope with risks. The model of flood management cycle in a resilient community, adapted from ten Brinke et al, 2008, has developed capacities in each of the phases (Mitigation, Preparedness, Response, Recovery). Defining characteristics of a resilient community against floods (Schelfaut et al, 2011): (1) knowledgeable and aware of the risk, (2) well-prepared and respond better when flood occurs, and (3) recover quickly from disasters” (p.836)

In order for the community to be flood resilient, Schelfaut et al (2011) identified three components where different measures can be implemented: interplay of institutions, flood risk and perception, and flood management tools. However, increasing flood resilience within the community relies on the strength of the linkages found in the community, where actors (local government, community organizations, individuals) are involved in a bottom-up management approach (Schelfaut, 2011). In a sense, these authors determine that it is important to have strong networks within the community in order to do build different capacities (Dzialek et al, 2013).

To say the least, Norris et al (2008) link capacities with community resilience and consider resilience as a process that connects adaptive capacities towards a desirable state of “functioning and adaptation after a disturbance” (p. 130). The key point in Norris et al
(2008) is the argument that community resilience is a “set of adaptive capacities” that are linked together – panarchies. The same as Sherrieb et al (2008), community resilience depends on four components: economic development, social capital, information and communication, community competence. All of these components have their own specific parts. These adaptive capacities are similar to the social capacities specified by Kuhlicke et al (2011). With this in mind, we can then make the argument that fostering the types of social capacity identified by Kuhlicke et al (2011) and adopting the definition of community resilience as a composite of these capacities as Norris et al (2008) consider, the build-up of social capacities then build community resilience. Determining the types of social capacity can inform inherent vulnerabilities in the community and building these can develop community resilience.

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*Table 1. The difference between an equilibrist and evolutionary resilience, taken from White and O’Hare (2014)*

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3 For example, social capital can be looked at as an aggregate of social support, social embeddedness, organizational linkages and cooperation etc. (Norris et al, 2008).
On a broader discussion of resilience, White and O'Hare (2014) offer two approaches to resilience: equilibrist and evolutionary and is summarized in Table 1. Since evolutionary resilience is concerned with an aim to be adaptive to the system’s disturbance, this kind of resilience can be likened to community resilience. To improve community resilience then, the planning approach that communities should consider should also be aligned with the evolutionary resilience, as indicated in the table. In such a way, the planning system together with its related management system should uphold a shift from a “cookie cutter” to “multitude” of approaches. In terms of building community resilience from floods, this may then involve a multi-actor and multiple approaches – where these focus on building social capacities.

**IV. The Planning System and Emergency Management System Framework**

Since one of the goals of this research is to recommend measures into the planning system, it is important then to understand the provincial and municipal planning system in High River. This section will outline the Alberta’s regional planning system and High River’s municipal planning system, providing a basic understanding of how planning works in the province and the municipality of High River. The intent of this is to make connections between flood risk management and the planning system and identify whether these linkages contribute to the vulnerabilities or community resilience. The end goal of this will hopefully ascertain how flood risk management practices/measures are incorporated in the planning system, and how it relates to emergency management system.
In a report done by the World Meteorological Organization (WMO) and the Global Water Partnership (GWP), it discusses the principle of vulnerability reduction and resilience building through fostering prevention and preparedness practices in Integrated Flood Management (IFM) (WMO, 2006). The caveat for a successful implementation and desirable outcome in curbing social impacts with IFM is the participation of those involved in the decision-making and execution of flood mitigation/preparedness practices (WMO, 2006). Having said that, the central idea that the IFM emphasizes is a multi-stakeholder engagement in all the phases of the decision-making, which should include civil society and experts (WMO, 2006). Therefore, the type of planning that the WMO (2006) proposes in IFM is participatory planning, which focuses on an inclusive approach in the planning process.

Taken from the report WMO (2006), Figure 2 provides the interaction between the flood emergency management, planning system and flood basin management. Therefore, Figure 2 shall provide a basis of analysis in linking the planning framework with the emergency management system, and how floor risk management measures are incorporated.

*Figure 2. Stakeholder interaction among the planning system, basin flood management and flood emergency management, taken from WMO (2006).*
Alberta’s Land Use Framework: the Regional Plan

Drawing from the Figure 2, one of the components to be analyzed is “basin flood management.” Currently river basins in Alberta are governed by regional plans, which are managed by the provincial government.

Committed to a responsible use of resources for long-term considerations in the economic, social and environmental dimensions, the Government of Alberta created the Land Use Framework (LUF), released on December 2008, to guide the land-use planning in the province (Government of Alberta, 2014). The main approach of the LUF is to divide the province into seven land-use regional plans, based on the river basin system. The regional plans will outline the strategic directions and visions through setting of policies and outcomes, along with performance indicators, for each region. These would consider the social, economic and environmental aspects of the region.

The legal basis of the Land Use Framework (LUF) is the Alberta Land Stewardship Act (ALSA) (2009), where it outlines the powers and processes that govern the land-use planning. The purpose of this Act then grants roles and responsibilities for each decision-makers (e.g. municipal bodies, Lieutenant Governor in Council, Minister etc.) and contemplates different dimensions in regional planning (e.g. multi-stakeholders, resource conservation, economic development) (ALSA, 2009). To evade any redundancy and duplicity, which may give rise to jurisdictional conflicts, the ALSA also considers different statutes such as the Municipal Government Act which gives local government powers to plan for future developments in Alberta and the Public Lands Act, which gives legislative bases on future developments of Crown Land (Government of Alberta, 2014). Within this Act, it also outlines what the respective regional plan should contain:
provisions on the creation, implementation, and monitoring of these plans (Government of Alberta, 2014). Overall, the ALSA is the mechanism that legally binds the regional plans to the different municipalities, provincial agencies, boards and the respective regions.

With that, of the seven regional plans that the provincial government, only two have been approved, one is in the first phases of development, and the rest have not yet been started (Government of Alberta, 2015c). The two regional plans that have been developed and came into force are the Lower Athabasca Regional Plan (LARP) and the South Saskatchewan Regional Plan (SSRP). Since the study site is in High River, a part of the South Saskatchewan region, this major research paper will only discuss the SSRP and its content.

**South Saskatchewan Regional Plan**

To help in conscious decision-making in South Saskatchewan region, the Government of Alberta created the South Saskatchewan Regional Plan (SSRP) which was approved by the cabinet on July 23, 2014 and came into force on September 1, 2014 (Government of Alberta, 2015a). The plan draws strategic direction from a broader and provincial level and considers different development activities in the region from forestry to agriculture (Government of Alberta, 2015a). The South Saskatchewan Regional Plan is a comprehensive regional plan that contemplates the vision for the future in the region and therefore shall support the regional policies. Through this regional plan, it aims to make the planning system more organized and effective and therefore implements a cumulative effect approach in decision-making. This means that the approach would be:
outcome-based, place-based, knowledge-based, adaptive, shared stewardship (Government of Alberta, 2014).

Due to having two different kinds of landownership (private and public) in the province, the implementation of the SSRP will be governed differently. For private lands, the Municipal Government Act (MGA) is the statute that governs these types of lands. Section 17 of the MGA stipulates the role of municipalities’ planning and development for land-use and the development of different planning mechanisms (Government of Alberta, 2014). Though the decision-making process for the municipality would be left to the local government authorities, the local planning documents should still conform to the regional plans. This means that municipality of High River’s set of planning mechanisms should be consistent with the South Saskatchewan Regional Plan.

On the other hand, the Crown lands are governed by the Public Lands Act, provincial parks regulations and the Highways Development and Development Act, which can carry out the goals set forth in the SSRP. The Government of Alberta also permits the public to do certain activities on these lands and the use of resources found on these lands through statutory consent. The management of these activities ensure that these lands are protected from practices that have adverse effect on the environment. Additionally, there are Integrated Resource Plans that support the resource management in region. The same as in private lands, these policies should be consistent with the SSRP.

In terms of consultation for these regional plans, the creation of the SSRP underwent different stakeholder review, ranging from municipalities to South Saskatchewan Regional Advisory (Government of Alberta, 2015a). There is a duty to consult for the first nations under Alberta’s policy on Consultation with First Nations on
Land and Natural Resource Management but this does not include Metis community however since there is no certainty that Metis do not hold constitutional rights in the South Saskatchewan region (Government of Alberta, 2014). As such, this may have an impact on the Metis community as their perspectives may be disregarded in the regional planning context. From this, the focus of consultation will center only the First Nation’s communities in the area (Government of Alberta, 2014).

The SSRP is composed of four components: Introduction, Strategic Plan, Implementation Plan, and Regulatory Details Plan (Government of Alberta, 2014). These components are hierarchical and are consistent from each other. The Introduction part of the plan specifies the purpose of the SSRP and its link to providing information on land-use. The Strategic plan provides the “vision, outcomes and strategic directions” that will help in coordinating the regional goals to the provincial goals (Government of Alberta, 2014, p.7). The Implementation plan details the “objectives and strategies” that will help in achieving the things set out on the strategic plans (Government of Alberta, 2014, p.7). The Regulatory Details plan specifies the different mandates upon which the decision-makers should comply to. Therefore, the SSRP is structured in a way that needs coherence among its different SSRP components, which then should be consistent with the regional vision and connect to the greater provincial vision. In summary, the nature of the hierarchy is depicted in Figure 3, adapted from SSRP.

As this research paper is focused on floods, the discussion of the SSRP will be limited on addressing flood management and how it is incorporated. Not to say that the other factors discussed on the regional plan are unimportant, but focusing on how the
regional plan seeks to address flooding will aid to give an understanding of flood
management in a regional basis.

In the strategic plan, there are three provincial outcomes (Government of Alberta, 2014):

- Healthy economy supported by our land and natural resources
- Healthy ecosystems and environment
- People-friendly communities with ample recreational and cultural opportunities (p.39)

The strategic plan also does not necessarily provide a strategic direction that
directly states the role of flood management with respect to the outcomes. Through the
“advancing watershed management” as a strategic direction however, flood management
can be addresses and links it to water resources planning.

Specific objectives are stated in the implementation plan and there are several
instances where they relate to flood management. In such a case, the objective to
establish the region as a “world-class, year-round, tourism destination.” (Government of
Alberta, 2014, p.50), one of the strategies is to “enhance Tourism Destination Areas
within the South Saskatchewan region.” (Government of Alberta, 2014, p.50) With that,
it mentions the flood of 2013 as the source of damages and it aims to rebuild Kananaskis.
This does not however specifically provide measures on how to achieve this goal.
Aforementioned, the strategic direction of “advancing watershed management” under the Part 4.Water, the outcome of having a healthy watershed and balancing it with human needs can then be attained. Several strategies have been put forth (e.g. improvement of water quality and quantity, collaborative water resource planning, irrigation and water conservation) but strategies that specifically deals with flooding are (Government of Alberta, 2014):

- Investing on water management infrastructure
- Planning to support climate change adaptation and ensure preparedness (includes berms, dikes, building codes, policy and legislation)
- Enhancing existing flood management systems (use of flood mitigation practices) (p.77-78)
All of these strategies rationalizes that through these flood mitigation strategies, there would be environmental benefits to the region and argued that these would be cost-effective in the long run.

There are other specific objectives however in the implementation plan, where specific aspects of water resources may aid in flood management. Under the “Enhanced Integrated Watershed Management”, an objective is to create regional approach to help in watershed management. Below are some of these strategies that may aim to address this objective (Government of Alberta, 2014):

- Improved management of riparian land (e.g. use of appropriate stepping back from the bodies of water)
- Use of best land management practices that reduce erosion and sediment transport
- Promote the use of planning information in decision-making and land management (e.g. vulnerability mapping) (p.83-84)

Under “efficient and resilient water supply”, another objective that relates to flood management are: (1) to achieve efficient use of water with the goal of supporting its current and future system and (2) to have a resilient water management regime that is able to accommodate changes. One of the strategies that the regional plan addresses this objective is to develop water management systems that optimizes during flood and drought periods. Other studies and information that will feed into this water management systems will include South Saskatchewan River Basin Adaptation Project, Water Supply Study, and Flood mitigation engineering studies (Government of Alberta, 2014, p.85). Another strategy is to “address the climate variability” (Government of Alberta, 2014, p.86), through flood and drought management planning and preparedness, and climate adaptation practices.
Aside from the water and flood management, there is a certain expectation that the Government of Alberta is to uphold, especially in their strategic direction. One of these objectives is to strengthen the connections between land-use planners and decision-makers in the creation of plans and cultivate a culture of “knowledge-sharing” in different communities. Through these objectives, the specific strategies include use of joint agreements or partnerships in inter-municipal planning, coordination of different planning activities with other stakeholder groups, and highlighting of “common” planning issues in the region. (Government of Alberta, 2014).

In terms of working towards sustainable communities, there are objectives that aim to support municipalities and stakeholders through a provincial guidance for land-use. Broadly speaking, various strategies that relate to land uses, agriculture, watersheds historic resources, and transportation have been employed to speculate what municipalities should be focusing on. These various strategies however are “presented in a general manner which allows municipal interpretation and application in a locally meaningful and appropriate fashion” (Government of Alberta, 2014, p.107).

Towards the end of the implementation plan, there is a section devoted to Monitoring, Evaluation, Reporting and Improvement on a continual basis. The reason for this is to basically ascertain how effective is the regional plan, and to ensure that the regional plan adapts to the ongoing changes in the dynamic planning system, as new information are becoming available (Government of Alberta, 2014).

With respect to the regulatory plan, it holds the policies and regulations section of the plan. This section outlines the administrative processes, definitions of concepts, and authorities associated to the regional. The regulatory plan also includes any statutes that
are related to any of environmental management, planning and development, watershed management and other statutes to ensure that there are no conflicts and jurisdictional issues with the regional plan (Government of Alberta, 2014).

Overall, the South Saskatchewan Regional Plan highlights the provincial priorities that maybe applicable to the South Saskatchewan river basin. The regional plan is comprehensive but broad plan that seeks to accommodate different facets of the region into decision-making. Emphasis on shared stewardship and collaborative planning among stakeholders has been constant throughout the Implementation Plan. Explicitly, municipalities, the Government of Alberta, and other stakeholders (First Nations and Aboriginals, quasi-judicial boards etc.) are encouraged to share information with each other in, but not limited to, watershed management and land-use planning.

Interestingly, the parts of the SSRP that are not legally binding are Introduction, Strategic Plan and Implementation Plan, as in Part 1 s.3 of the SSRP. This may have some implications as the provisions expressed in these areas may be deemed flexible and these sections only provide information to different stakeholders on matters of decision-making and planning. Implementing the regional plan may then be open to different interpretations, which is dependent on the decision-making body.

The regional plan does not provide enough leverage for it to be effective and efficient. For instance, the strategic directions and objectives stated in the strategic and implementation plans are not entirely reflected in the regulatory plan. There are mentions of the land-use patterns objectives on the implementation plan, but no where in the regulatory plan aims to achieve this. In such a case, there are still loopholes and missing links within this regional plan; the vision, outcomes, objectives and strategies are not
supported in the regulatory framework of the plan. Instead of the regional plan being comprehensive, it does not have “teeth” to be able to enforce actions that will achieve the goal stated in the regional plan.

With respect to flood management, there is currently no regional basin flood management plan though some aspects of it are incorporated into this regional plan. As implied in the plan though, watershed management is seen as one of the vehicles in which flood risks can be managed. When it comes to the regulatory dimension of flood risk management, however, there is currently none speculated in this regional plan. Additionally, there is no effort to reduce flood risks as there is no strategic direction, outcome or objective that directly speaks to flood mitigation or protection in a regional level. In conclusion, the South Saskatchewan Regional Plan may seem to be a comprehensive and integrative plan however it should not excuse the provincial government from providing some basic regulatory measures that can reduce or evade potential flood impacts.

**High River Municipal Planning System**

Another component of the stakeholder interaction, as identified in the Figure 2, is the municipal planning system. In this regard, the different High River municipal documents will be analyzed, to determine how the planning framework is structured and how we can incorporate the flood risk management measures. In Alberta, there are statutory\(^4\) and non-statutory planning documents so in this particular study, discussions will only be limited to statutory documents.

\(^4\) Statutory planning documents created by municipalities to be cognizant of existing and future development within their areas, to direct local planning and development. These include Intermunicipal Development Plans (IDPs), Municipal Development Plans (MDPs), Area Structure Plans (ASPs), and Area Redevelopment Plans (ARPs). (Government of Alberta, 2013).
Aforementioned, the central legislation that mandates the planning and development in the Alberta’s municipalities is the *Municipal Government Act (MGA)* (2012). Being the largest statute, by far in Alberta, The *Municipal Government Act* contains over 18 parts with more than 650 sections and presents some guidelines and regulations on governance, planning and development and taxation (Government of Alberta, 2015b). It is through Part 1 section 3 of the *MGA* outlines the purpose of the municipalities:

(a) to provide good government,
(b) to provide services, facilities or other things that, in the opinion of council, are necessary or desirable for all or a part of the municipality, and
(c) to develop and maintain safe and viable communities. (p.35)

Through the *MGA*, it gives the roles and responsibilities, powers and processes with respect to financial matters, town councils, public participation and, planning and development. The *MGA* offers legislative framework and provides the regulatory mechanisms in the municipal structure and operations.

Within the *MGA*, there are areas that needed to be highlighted, with respect to planning and development. Part 5 of the *MGA* identifies the powers, duties, composition, and other related matters that relate to the town council. This is an important piece that gives the council the power to oversee the municipal processes in Part 5, Section 142 of *MGA*, which states that “each municipality is governed by a council”. Through this provision then, the town council can then create different planning authorities, as stated in Part 17, Division 3, Section 623-627 of the *MGA*, who would carry out the planning and development processes. More importantly, Part 17, Division 4 of the *MGA* provides the statutory plans that are inherent in the planning of the municipalities, though these still
need to go through council approval. That being said, the statutory plans implemented by the municipality must conform to regional plans (i.e. South Saskatchewan Regional Plan) and, in the event of a conflict or contradiction, the regional prevails, as stated in Part 638.1 of the MGA.

The three statutory documents that will be discussed in this section will be: Inter-Municipal Development Plan, High River Town Plan and Land-Use Bylaw (Town of High River, 2012). In High River, there are other statutory plans such as an Area Structure Plan that are specific to a geographic location. Discussing each and every statutory plan there is in High River may only duplicate findings and therefore rendered redundant. Only these three statutory plans will then be highlighted.

The Inter-Municipal Development Plan outlines provisions on the land uses and the consultation process in areas that border the town of High River and the town proximate to it (e.g. M.D. of Foothills). The High River Town Plan (which includes the Municipal Development Plan) outlines the policies for future growth, contemplating land uses, infrastructure, community services and includes High River’s Growth Management Strategy. Lastly, the Land-Use Bylaw specifies “key planning tools for guiding and controlling development in town”, through identification of land use designations, permitted and discretionary uses, and the process of development applications (Town of High River, 2012).

**Intermunicipal Development Plan (IDP)**

According to the Part 17, Division 4 of the MGA, stipulates the creation of an Intermunicipal Development Plan:

631(1) Two or more councils may, by each passing a bylaw in accordance with this Part or in accordance with sections 12 and
692, adopt an intermunicipal development plan to include those areas of land lying within the boundaries of the municipalities as they consider necessary. (p.340)

In High River, the Intermunicipal Development Plan (IDP) is jointly adopted by the Municipal District of Foothills and the Town of High River (Town of Higher and M.D. of Foothills, 2012), and aims to address the potential land-use activities and the developments in lands adjacent to each other. Through this, the IDP provides a process in which planning can address conflicts in areas that border each other, indicate what land-uses are permitting or discretionary in these areas, and identify policies that control or regulate developments in the areas concerned.

There are several instances that flood management practices were cited, in the Plan area. Throughout the document, areas that are flood-prone or have a potential to become flooded have been identified. Citing these areas can help in the process of managing flood risks. For example, Highwood River and Little Bow River were determined to be susceptible to flooding, which can be problematic in long run and constraining for future development. In such a way, policies 5.2.2 and 5.4.1 of the IDP provide options that can be incorporated in the event that areas are deemed unsuitable for floods; either through annexation of agricultural lands or restrictions of developments.

In addition, as stated in the policy 5.12, “lands determined to be in the floodway of the Highwood and Little Bow Rivers has been given the designation (SE) Special Environmental Area.” (Town of High River and M.D. of Foothills, 2012, p.42-43) This provision however needs flood mapping to delineate areas that are in the floodway and flood fringe. It is then imperative that the map be updated periodically to reflect current flood risks, as revealed in the flood mitigation studies, stated in policy 5.12.2.
In conclusion, the Intermunicipal Development Plan can address issues that are pertinent to flood management. The IDP encourages collaborative planning between the two municipalities, especially in areas that are proximate to each other. A benefit of this plan is that it proposes Joint Planning Areas in Four Areas and acknowledges interests and responses on each of the municipalities’ actions that they are willing to undertake. Additionally, the IDP support interface planning between the two municipalities in determining specific priorities of each municipality; one being a limitation on floodplain development. Through the IDP, it forces both municipalities to work together in the assessment of future developments, reducing the risk of redundancy and loopholes. Though it does not address comprehensive flood management systems, at least there are policies in place that aim to minimize flood risks.

**Municipal Development Plan (MDP)**

The High River Town Plan, also known as the town’s “Municipal Development Plan”, provides the specific vision to the town of High River. This town plan is composed of four different components: the Community Vision Statement, Goals, Objectives and Policies (Town of High River, 2013). As such, the Community Vision Statement stipulates the direction that the town of High River will work towards and the Goals, Objectives and Policies will reflect this direction accordingly. Broadly speaking, the goals will form the vision statement, objectives will address these goals, and the policies will highlight these actions to be done.

One aspect of this town plan is that this is a “living document”, where this town plan can be amended periodically (Town of High River, 2013). This would be beneficial.

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5 Four Areas identified in Table 6.1 of the IDP are: (1) The High River and Little Bow riparian lands and floodway, (2) Proposed future highway commercial area east of Highway #23 and 498th Avenue, (3) Existing country residential parcels located along the west side of 112th Street east of Highway #2, and (4) 498th/Highway #543 corridor from the interchange at Highway #2 to 64th Street east. (Town of High River and M.D. of Foothills, 2012).
for potential and future developments in implementing flood management because it would allow the creation of goals, objectives and policies that may regulate, limit or restrict developments in flood-prone areas. Its flexibility then can accommodate new flood mitigation measures once new information is available.

Within this town plan, there are specific goals, objectives, and policies that relate to flood management. For example, objective 2.13.4 states to “effectively manage development within or adjacent to hazardous areas” and policies that will address this objective shall include a completion of survey of hazard-prone locations, development of guidelines for activities in these locations, and incorporation of an overlay in the Land Use Bylaw within flood fringe and floodway (Town of High River, 2013).

Within the town plan, there is also a Growth Management Strategy (GMS) that contemplates on the future growth of High River, and guides the land-use planning of High River. Information of different aspects (social, economic and environmental) of High River is discussed and how this information will address future planning and development. In terms of flood management, the GMS identifies a Flood Management Master Plan (FMMP) which is a detailed review of flood risks, which includes flood mapping exercises within High River (Town of High River, 2013). The FMMP indicates whether a land is suitable for development or not.

In conclusion, High River’s Municipal Development Plan is a comprehensive plan that seeks to detail the long-term vision of the town of High River and integrating the pillars of sustainability in its town plan (Town of High River, 2013, p.5): Leadership and Governance, Economic, Social Well Being, Recreation and Cultural, and Environment and Infrastructure. Together with the Growth Management Strategy, the town plan

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6 The FMMP is not easily accessible. Access to the FMMP was only granted for a limited time.
outlines the actions to be implemented to achieve the community vision. The same as the IDP, the town plan should also conform to SSRP.

**High River Land-Use Bylaw (LUB)**

In terms of specific provisions that aim to address policies set out in the MDP, the Land-Use Bylaw is a mandatory part of a municipalities’ set of statutory plan that seek to “prohibit or regulate and control the use and development of land and buildings in a municipality.” (Part 17, Division 5, Section 640, *MGA*, 2000). This means that different standards, processes or measures that support the policies outlined in the IDP and the MDP can be incorporated in the bylaw.

In such a case, flood management measures can be integrated to reduce flood risks in specific locations. For instance, Section 102 of the Land-Use Bylaw provides a Flood Hazard Overlay, part of Overlay Districts, that regulate developments and controls what activities or uses can be done in floodways and flood fringes (Town of High River, 2014). This overlay stipulates different measures to minimize flood impacts such as restriction of certain activities in the floodway and flood fringes.

The Land-Use Bylaw is an important tool that aids in directly controlling developments, both existing and future developments. It is important however to be cognizant and be familiar of the terms used in the land-use bylaw, especially how the municipality of High River defines floodway and flood fringe. Arguably, these terms should be consistent with the definitions used by the province to avoid any inconsistency.

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7 Overlay Districts seek to “modify or supplement the regulations for permitted and discretionary uses in specific areas of High River.” (Town of High River, 2014a, p.131)

8 Floodways is defined “a river or other channel and adjoining lands that would provide a pathway for floodwaters in the event of a flood of a magnitude likely to occur once in one hundred years.” and flood fringe is defined as “those lands abutting the floodway that would be inundated by floodwaters of a magnitude likely to occur once in one hundred years” (Town of High River, 2014a, p.11)
In summary, it is important to be familiar with the process and implementation of the statutory plans and how they are linked together. Through this municipal planning framework, planners can understand how to better consolidate ideas that connect different measures used in flood risk management with land-use policies. This section briefly summarizes and shows how municipalities in Alberta arguably integrate different flood mitigation mechanisms in different municipal planning documents.

**Emergency Management in High River**

The last component of the stakeholder interaction, as in stated in WMO (2006), is the emergency management system. It is imperative in Alberta, especially in High River where flood is a recurring event, that municipalities have a local emergency plan. It is through the provision of Section 11.2(1) of the *Alberta Emergency Management Act (AEMA)* (2000) that municipalities and their town councils are mandated to create an emergency management organization to “act as the agent of the local authority in exercising the local authority’s powers and duties under this Act.” Through this municipal emergency management agency, different emergency response measures can be created and implemented where the director of the agency shall, through provisions of section 11.2 (2) of the *AEMA*:

“(a) prepare and co-ordinate emergency plans and programs for the municipality,
(b) act as director of emergency operations on behalf of the emergency management agency,
(c) co-ordinate all emergency services and other resources used in an emergency, and
(d) perform other duties as prescribed by the local authority”(p.9)

Aside from *AEMA*, another regulatory piece that deals with local emergency management is the High River’s Emergency Management By-law, 2014, which guides
the emergency operations in High River. Through this bylaw, it allows the creation of an emergency management advisory committee, the review, approval and adoption of a municipal emergency plan, and the appointment of a Director of Emergency Management; all of these contingent upon the town council’s approval (Town of High River, 2014c).

In High River, the Municipal Emergency Management Plan (EMP) exists to provide direction on measures related to emergency management and uses the Incident Command System (ICS)\(^9\). Within this EMP, it highlights “emergency operations, organizational structure, roles and responsibilities, and the coordination of resources necessary to execute the effective management of emergencies in the Town of High River.” (Town of High River, 2014b, p.11)

To briefly summarize the contents of the High River’s EMP, the plan espouses the different phases of emergency management: Mitigation, Preparedness, Response, and Recovery, but also supports measures such as risk assessment and transition to recovery (Town of High River, 2014b). Within these phases and transitions, the plan identifies and consolidates different plans that work together, making this EMP comprehensive.

For instance, during the “response” phase, there is an Emergency Operations Center Plan, Crisis Communications Plan, and Emergency Social Services Response Plan; these plans all interact with each other and identify how the Emergency Operations Centre is activated and functions during an emergency event, what the services are to be delivered for those affected in the emergency event, and how the municipality communicates the emergency event to different stakeholders (Town of High River, 2014b). All of these plans form the response component of the plan, and are triggered in

\(^9\) For more information on the ICS program, refer to http://www.icscanada.ca/
times of crises. Other specific plans related to specific phases are indicated in the EMP.

Aside from that, one of the important parts of the EMP provides is the organizational structure of High River which identifies different actors and how it changes during times of State of Local Emergency. Additionally, this EMP indicates the roles and responsibilities of each of the stakeholders during the response, mitigation, preparedness and recovery phases. Outlining and indicating what the different expectations of these actors helps avoid the duplications and redundancy in all phases of emergency management. This encourages an effective and efficient implementation of the EMP while also coordinating different plan components of each phase. Effort and resources can then be put towards good use.

V. Methods

In assessing the social linkages of floods, different stakeholders that are involved in the flood management and planning systems, and emergency management systems were interviewed. Due to limitations in time and available information, the research was only able to interview seven respondents, via telephone or email, which ranged from municipal department staff and NGOs. Though the research initially aimed to determine social impacts to floods in High River holistically, individual residents of High River were not interviewed in the process. This major research paper focuses more on the impacts to structural social capital than cognitive social capital (Sherrieb et al, 2013).

As for the recruitment process of the interviewees, a municipal planning staff was contacted through e-mail to inquire their willingness to participate in the study. After setting up an appropriate time and day for an interview, the staff and I discussed the bounds of this research which helped her to gauge appropriate contacts for me to
interview. Subsequent interviews were set up through the municipal planning staff. A snowball sampling method then was employed as this eased the data gathering process. Via e-mail correspondence, an appropriate time and date was also set up to do an interview where both convenient to the interviewer and respondent. The interviews averaged about 30 minutes each, depending on the nature of the question and the length of response. Thus, three of the total respondents were willing to be interviewed with the help of the municipal planning staff.

In order to get other perspectives, as the network of contacts were exhausted, remaining respondents were contacted directly to determine their willingness to participate. The same process was done: email correspondence with the respondent, setting up an appropriate date and time, and interviewing the respondent. However, one interviewee was also not able to do a phone interview; a questionnaire was sent via email instead.

Overall, there were only seven respondents (four from the municipality and three from NGOs) that were able to participate in this research which may render analysis incomplete or imprecise. As promised, no respondent shall be named or linked to an identifier in this research paper so to remain anonymous.

Appendix 1 shows the types of question that were asked.

VI. Findings and Analysis

Interaction of the Planning Framework and Flood Management Systems

As a whole, there are interactions among the South Saskatchewan Regional Plan, the Municipal Planning System and the Emergency Management Systems of High River. Examining the documents, the interaction among planning and management systems is
different from the framework that WMO (2006) offered.

River basins in Alberta are currently managed through the Land-Use Framework (LUF) which outlines how the region is contemplated in the future, through consultation with various stakeholders. With respect to a river basin flood management, the regional plan does not have a regional flood management plan in place. As stated in the section 4.12 of the South Saskatchewan Regional Plan, the plan supports approaches in which “address the climate variability”, which aims to: specifically generate an up-to-date flood hazard mapping to be utilized in decision-making, develop a flood hazard mitigation plan at the community level, and advance data and modeling management. Rather than developing a river basin flood management plan, the task is delegated to the municipality in creating a local flood management plan.

As stated before, the land-use plans that the municipalities have created should conform to their associated regional plan. Through the provisions in the MGA and the ALSA, High River’s municipal planning documents should be consistent with the South Saskatchewan Regional Plan. In the event that there are conflicting provisions/ideals, the regional plan shall trump the municipal planning documents.

Since the regional plan does not include an existing flood management plan, there is no conflict between the regional and municipal planning systems when it comes to flood management. Therefore, the Flood Management Master Plan (FMMP) will be adopted as the flood management plan within High River. This is contrary to the framework suggested in Figure 2, where flood management plans should then be administered in the regional or river-basin level and not on a municipal level.

Another thing to note in this framework is that the flood emergency plan, in High
River considered as the High River’s Emergency Management Plan (EMP), does not interact with the Flood Management Master Plan (FMMP) and therefore both are created independent from each other. Though the town council of High River both approves and implements the EMP and the FMMP, there is no interaction between the two plans, contrary to what the WMO (2006) suggests. A simplified diagram of the interactions of the planning and management systems is shown in Figure 4.

In summary, the legislative and regulatory frameworks in different levels of the government do not allow the interactions of the plans and stakeholders in flood management. This is to say that processes and mechanisms do not allow a collaborative planning framework and management systems when it comes to the flood risk management. Different stakeholders (community/residents and NGOs) have limited roles in decision-making or participation. A participatory planning approach is required, where stakeholders are engaged in different process and can there be capacity building, especially in emergency management planning (WMO, 2006).
Interaction of stakeholders within High River

In terms of the determining the linkages among stakeholders and the roles they played in flood risk management, the Key Informant Interviews (KIs) helped in providing context on these processes.

As far as the planning and development goes, it was revealed that the Planning and Development office in the town of High River is a division of the Engineering, Operations and Planning Department. Various roles and responsibilities of planners included reviewing development applications, subdivisions and major industrial
applications, but also included the policy-making component as well. With the amount of tasks that the Planning and Development undertakes, it is implied then that planners are limited to land-use planning, though there are some policies that can be undertaken towards flood protection. Additionally, the planning office did not necessarily work closely with the Government of Alberta in the flood mitigation structural projects such as berms, dikes and diversions. The respondent mentioned however that: “the engineering division was more in contact with the Government of Alberta” (personal communication, July 7, 2015).

Due to the floods that occurred in 2013, the “Renew” department was established to help in flood mitigation and flood recovery. Primarily funded by the Government of Alberta, the renew department is a separate department that communicated with the town of High River but also with other municipalities in the region (e.g. M.D. Foothills, city of Calgary), working towards long-term recovery. Housed in a temporary sprung structure, there are different divisions in this department which includes business renewal, financial services, records management and human impacts. Furthermore, most of the employees that came on board to work for the department are contractors, consultants, and seconded municipal staff.

High River’s Renewal Department extensively helped the rebuilding of the community of High River. Through its Operations Renewal division, different projects have been carried out. Examples of this include the increasing of dike heights, protecting town through its design, and improving downtown to make it inviting. In another division, the Emergency Management division does the emergency planning for the municipality. Some of the role of this office are public education and outreach, and
update of the municipal emergency plan. As such, this department is an integral part of the community disaster preparedness.

Though it provides the services that are needed for community rebuilding, the Renew department is only but temporary. Once the community has been properly rebuilt and protected against the floods, “the Renew department will cease to exist”. Since funding for this department relies on the Government of Alberta, the lifespan of this department is dependent on the province’s direction for the town of High River. Without a permanent department that overlooks or manages the mitigation and recovery process of the community, it renders the community vulnerable to flood impacts. If rebuilding or mitigation should be delegated to other departments, such as planning, these departments will need more human and financial resources. As implied in an interview with a respondent: “if the planning department does the recovery process as well, on top of the land-use development approvals, it will be busy.” (Personal communication, July 7, 2015).

As far as the renew department’s working relations with other stakeholders, the department’s involvement is varied, and dependent on the nature of the project. For example, the Operations Renewal works with the Disaster Recovery Program (DRP)\textsuperscript{10}, a program run by the Government of Alberta, to provide funding for those homeowners who lost or damaged their house. The Communications division of the Renew Department, along with a Non-Governmental Organization (NGO), also promoted the DRP, to reach those people who are not aware about the program.

\textsuperscript{10} The Disaster Recovery Program is a Government of Alberta that “provides financial assistance for uninsurable property damage, loss and other expenses.” (Government of Alberta, n.d.)
On the other hand, the Emergency Management office does not necessarily work with the Government of Alberta. With respect to its relationship with NGO, the office of Emergency Management has used its connections or partnerships to “piggyback” on the delivery of disaster preparedness to the public. In creation and amendment of municipal emergency plans and initiatives, the Emergency Management office has to go through the town council for approval.

With providing different of services immediately after the floods of High River, the Family of Community Support Services has worked with the Emergency Operations Centre for six days to resettle those people affected by the floods. This agency is eighty percent funded by the Government of Alberta while the twenty percent comes from the municipality, and provides direct services for the residents of High River such as the Parent Link and Community Resource Centre.

In addition to the municipality, an NGO also worked in facilitating/mediating the resettlement of the homeowners to their homes. Through conducting a Financial Needs Assessment, the homeowners can know if they are eligible for funding from this NGO, to carry out repairs in their homes. In addition, this NGO also helped in connecting homeowners to the DRP in order to acquire additional funding, if needed. Furthermore this NGO also promoted the DRP to the public, especially to those who do not know about this program. To ensure that the home is suitable for “living”, after being marked as Not Fit for Habitation\(^\text{11}\) (NFH), this NGO works with the homeowners. In some instances too, the planning division is involved in this when homeowners apply for building permits, to ensure that the house is habitable. Furthermore, this NGO also worked with

\(^{11}\) Alberta Health Services (AHS) inspects the homes whether these are NFH or not. More information can be found in here: http://highriver.ca/index.php/en/component/content/article/9-uncategorised/455-remediation-for-not-fit-for-habitation-nfh-homes
the town of High River in order to amend the application process of the DRP to reduce any inefficiencies.

In summary, the interactions of stakeholders and the processes and mechanisms are diagrammed in Figure 5. The teal color represents the different stakeholders while the orange/peach color represents the processes or measures that connect the different stakeholders. The bolded lines means that these are part of the municipal department. The “line with arrows” provides a direct connection while the “line dashes” implies an indirect connection. Direct connection implies that there are formal ties (through legislation, regulation, policy) between the two entities such as program delivery, consultation, project approval etc. Indirect connection refers to informal ties between the two entities such as “piggybacking” or undefined working relations.

One thing to note in the Figure 5 is that the community had limited participation in the interactions between provincial and municipal governments and NGOs (i.e. arrows point towards the community). It seems that every process in the diagram, it aims to serve the community, but little is done to have community consultation or engagement.
Some positive and negative social impacts of flooding were revealed and outlined in Table 2. Analyzing these impacts can give some insights on vulnerabilities that are inherent in the community. The social impacts were grouped as individual and community as suggested by Gruntfest (1995) and according to the phases of disaster.
Examining this however, the disaster management cycle is not clear-cut and the phases overlap (Gruntfest, 1995). This also indicates that impacts may also be long-term, as Merz et al (2010) indicated. Nonetheless, the social impacts from each phase of the disaster management cycle were discerned and interpreted by the author, based on the interviews.

Unfortunately, the connection between the social impacts and vulnerabilities and coping or adaptive capacities cannot be completely established. Since the only respondents were from the municipality and NGOs, variables such as community cohesion, connectedness or “tight-knittedness” cannot be determined. In order to get a broader picture, residents of High River need to be interviewed as well. Due to this limitation, most of the social impacts revealed and identified pertain to structural social capital. Only the Post-Traumatic Stress Disorder (PTSD) and lack of trust in disaster preparedness were perceived to affect cognitive social capital.

It can be said however that the lack of connectedness among different actors/stakeholders are, in itself, vulnerabilities, as implied by Kuhlicke et al (2011). Arguably, where there are impacts, there are connections lacking that both affect vulnerabilities and social capacity, influencing community resilience. For example, the lack of coordination and communication among government and agencies, as one respondent expressed, may pose a threat to community’s recovery efforts. It may take residents longer to go back to their houses due to the inefficient appeals process of the DRP, only serving to perpetuate vulnerabilities of people to the next flood event. Additionally, one respondent also expressed residents’ refusal to be consulted on emergency preparedness only furthers their vulnerability and shows their lack of trust in

12 Adapted Corina Warfield’s disaster management cycle as found in [http://www.gdrc.org/uem/disasters/1-dm_cycle.html](http://www.gdrc.org/uem/disasters/1-dm_cycle.html)
the local government. The growing lack of faith in emergency preparedness measure renders the residents susceptible to floods.

In a research done by Dzialek et al (2013) on social capacity with flood-prone areas in Poland, they express that other forms of social capacity, such as knowledge capacity and motivational capacity, are interdependent with social capital or network capacity. This means then that it is crucial to build social capital in order for other social capacities to flourish.

Relating back to the social capacity, it is critical that the residents have a strong social network that they trust. For example, if residents trust and develop a strong relationship with the emergency management office, which promotes social capital (Putnam et al, 2004), this will perhaps increase the resident’s knowledge capacity. Another thing is that the creation of the renew department (all divisions) has been instrumental in facilitating different social capacities (e.g. increasing network and knowledge capacity with working NGOs and provincial government; increasing financial capacity working with the DRP). NGOs are also crucial organizations that encourage the development of these social capacities (e.g. increasing financial capacity for residents through the DRP). Having these types of organizations that foster these social capacities are considered to be resilience factors then. Therefore, NGOs need to be included in the development of High River’s disaster management programs; not just in the implementation of these programs but also in the decision-making as well.
Table 2. Some of the social impacts of floods revealed from the interviews

<table>
<thead>
<tr>
<th>Phases of Disaster Cycle</th>
<th>Response</th>
<th>Mitigation</th>
<th>Recovery</th>
<th>Preparedness</th>
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<td><strong>Individual</strong></td>
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<td></td>
<td></td>
<td>Post-Traumatic Stress Disorder (PTSD)</td>
<td>Emotional Sensitivity to floods</td>
<td>Loss of trust in emergency preparedness</td>
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<td></td>
<td></td>
<td>Exhaustion from employees</td>
<td>Exhaustion from employees</td>
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<td><strong>Community</strong></td>
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<td></td>
<td>Rise of spontaneous volunteers</td>
<td>Renew department initiatives for mitigation</td>
<td>Renew department initiatives for recovery</td>
<td>Loss of trust in emergency preparedness</td>
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<tr>
<td></td>
<td>Lack of communication and coordination</td>
<td>Hiring of employees for renew</td>
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<td></td>
<td>Migration due to land buy-outs (Wallaceville and Beachwood)</td>
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VII. Discussion

**Need for a Shift in Flood Risk Management**

According to White and O’Hare (2014), there should be a focus on the resilience that is adaptive, concentrates on the societal impacts and encourages the transformability. In other words, White and O’Hare (2014) challenge communities to rethink whether to support “resilient buildings or resilient societies.”
In the past, the flood risk management has focused on flood structural measures in minimizing the occurrence of flooding. In light of the climate change, however, there is a perceived increase of frequency in flooding. With climate change Ogundeji et al (2013) claim that floods will occur more often with varying intensities, which makes it difficult to plan. White also highlights that “…not all floods can be predicted, let alone prevented” (Scott et al, 2013, p.107). Planning for uncertainty is then tricky as both of these authors suggested.

Traditionally, as we have seen in England and Wales (Parker, 1995), protection and risk reduction from floods are done through the construction of flood structural measures such as berms, dikes, and diversions. However, this may lead to more developments in flood-prone areas and encourage the “escalator effect” (Parker, 1995). Burby et al (1999) also imply that these structural measures, in conjunction with “safe development” within flood-prone areas, perpetuates the mentality that it is in “society’s best interest” (p.252). These insinuate that developments in flood-prone areas are secured.

As climate change is added into the equation, it may perhaps be difficult to reduce flood risks, especially when an increasing dependence on structural measures only encourages “temporary safety”. Even then, cost of maintenance and replacement of these structural measures is expensive. For this reason then, a different management system is required then.

13 Escalator Effect is characterized by “progressively higher levels of structural flood defence are constructed to protect against progressively increasing flood damage potential, which is mainly caused by post-defence development of floodplains.”(Parker, 1995, p.343-344)

14 “Safe Development” assumes that safety standards set forth by the federal government can fit in all localities and developments that currently in place can be changed immediately to increase their safeness (Burby et al, 1999).
Among other authors, Scott recommends a shift towards a “more strategic, holistic, and long-term approach”, where flood risk management strives to alleviate flood impacts or enhance flood resilience (Scott et al, 2013, p. 103). This type of flood risk management may perhaps be well-suited, as this may incorporate planning process in risk reduction. It has been cited time and time again that planning has the capability to reduce disaster risk. Through the planning department, the local government will be able “reduce losses through land-use planning and management.” (Burby et al, 1999, p. 248) There is then power in planning to change the flood risk regime.

Aforementioned, the flood management is implemented at the local level and therefore considerable hazards planning for floods should be done by the town of High River, i.e. local government has the onus in reducing disaster. As evidenced by the Flood Management Master Plan (FMMP), the current and dominant approach in managing flood risks is through techno-rational, which “embraced equilibrist engineering solutions.” (White and O’Hare, 2014, p.942) As one respondent expressed, management of flood risk through “extensive rebuilding and increasing height to prevent future flooding.” (personal communication, July 14, 2015) Thus, I argue that a more comprehensive flood management plan that integrates the structural measures but also encompasses different community aspects, especially one that serves to protect the community through other means, need to be made.

*Issues of Connections*

As this study is concerned with the vulnerabilities and coping or adaptive capacities inherent in the community, vulnerabilities can be viewed as the lack of connections among stakeholders that would have contributed or facilitated the rebuilding
of the community. Due to this, other stakeholders group such as the community is rendered exposed or susceptible to flood impacts if their voice is left unheard.

In the planning process of Town Plan, public consultation was carried out which provided the community a vehicle to voice their concerns, as stated in section 2.4 of the Growth Management Strategy. In the same way, the High River Land-Use bylaw is subjected to a public hearing as required by the Municipal Government Act, before the Council’s adoption. The planning process has allowed a platform where the public can provide their input, though it is not directly used in the flood management process. As mentioned before, the municipal planning documents can incorporate flood management measures (e.g. zoning, flood standards, flood mapping), more specifically the flood mitigation and preparedness, therefore the community should be involved in these discussions.

Throughout the interviews, it has been apparent that there is a lack of community input into the decision-making or participation. For one, the current institutional framework in the Integrated Flood Management, in High River, does not encourage or support the extensive community responses as being an integral part of decision-making in flood management. There is already a Flood Management Master Plan (FMMP), though there is uncertainty whether there was public consultation. As far as flood emergency management goes, the creation of the municipal emergency plan is mainly through a top-down approach where the Director of Emergency Management develops a plan and is approved by the town council. There are some instances where residents can comment on the emergency management plans, which then goes through the town council. The council then directs the necessary changes to the Director of Emergency
Management. As one respondent mentioned, the office of Emergency Management “does not deal with residents, but with local organization.” (personal communication, July 15, 2015)

The role of the NGOs or community organizations can be described or likened to an unsung hero. One of the roles that the NGO adopted is to facilitate the Disaster Recovery Program, a Government of Alberta program, to residents who have been affected by the recent floods. This NGO can better gauge whether residents are eligible for getting money from the provincial government. This will, in turn, help in a thorough assessment to make the appeal process “run more smoothly”, as one respondent implied (personal communication, July 28, 2015). Therefore, the role of NGOs in the community is a mediator among the municipal and provincial governments, and the community. Still, NGOs have limited involvement with the municipal government in terms of decision-making or service delivery in planning and management systems.

It is then important that the local municipal plans should encourage a more inclusive and extensive public consultation process can help in build social capital. Social capital can aid in promoting social capacity and developing community resilience. Townshend et al (2015) perceives that lowered resilience, due to low social cohesion in the community, may not be able to participate to disaster preparedness, response and recovery. This renders community vulnerable to floods, though there are plans, programs or policies that are specifically address flood risks.

**Social Learning in social capacity building**

Within the literature of community resilience and exemplified in the WMO (2006) diagram (see Figure 2), there is a need for capacity building. Depending on what “sets” of
capacity to develop is contingent upon the decision-making body, whether it is coping capacity or adaptive capacity. Coping capacity is distinguished from adaptive capacity in that coping capacity considers to increase potential on a short-term basis while adaptive capacity serves to aid the system in a long-term timeframes (Henly-Shepard et al, 2015b). In this regard, the communities need to build adaptive capacities, in the development of these social capacities.

In building social capacity, there also exists an interventionist and participatory approaches where both approaches are linked together (Kuhlicke et al, 2011). The interventionist approach intends to increase social capacity on a broader scale while the participatory approach promotes social capacity on a localized or smaller level (Kuhlicke et al, 2011). Another distinction to be made between the two is that the interventionist approach focuses on the policy and regulatory dimensions whereas participatory approach emphasizes on capacity development of local stakeholders (Kuhlicke et al, 2011). As there already exists a planning framework and the management systems in High River that fosters an interventionist social capacity building for flood risk management, a participatory approach in social capacity building is required.

Flood risk management then needs to be framed in a broader sense that encompasses different stakeholders and engages risk communication on an ongoing basis as Kuhlicke and Steinfuhrer suggested (Scott et al, 2013). Since flood risk management and planning is done predominantly at the municipal level, I argue however, considerable time and effort is necessary to use a participatory approach in social capacity building that enhances adaptive capacities of the community. Through this, social networks can be strengthened while it can establish different types of social linkages.
In order to achieve this, a method that communities can consider to implement when managing and planning for flood risks is through social learning. Henly-Shepard et al (2015a) identified that networks can be rigid where the degree of learning is limited, such as government structures. Hence, Henly-Shepard et al (2015a) argues that mutual learning is needed as this affects the potential of individuals to reform the community after the disaster event.

Social learning can then be implemented as a way “for collective decision making in societal processes by complexity, uncertainty and multiple social perspectives” (Johansson et al, 2013, p.18). Samaddar et al (2015) also provides that social learning encourages a careful discussion among stakeholders through which they “work together and build relationships to attain a collective action.” (p.155). Through this collaborative approach, social learning can address concerns of uncertainty and complexity through this deliberative planning (Selin et al, 2007), but also fosters trust that produces collective “actions” within the community (Putnam et al, 2004). Social learning is a way in which the community, municipal government and NGOs can encourage mutual learning, reach a consensus in decision-making, and develop a collective action plan. As Johansson et al (2013) put it, “social learning seems to have its greatest value as a practical framework for exploring critical elements of complex problem solving, especially issues with socio-ecological dimensions.” (p.19)

As evidenced in the Findings section, there are still lack of connections that perpetuate vulnerabilities and hinder the development of social capacities. These then need to be addressed in order to increase community resilience. Revisiting Kuhlicke et al (2011) typology of social capacities, social learning can facilitate the connection of
different linkages which, in turn, build these social capacities for community resilience, as defined by Norris et al (2008). Gunderson (2010) suggests that social learning provides a chance for communities to pursue collective action in a socio-ecological system.

Different methods of social learning different organizations or communities were able to increase different social capacities. Through the Yonmenkaigi System Method (YSM), the participants were able to put forth their ideas as a group, debate these ideas, and assemble an action plan for disaster preparedness (Samaddar et al, 2015). This process then encouraged information and knowledge sharing among the participants which increased not only the community’s knowledge capacity but also their governance and network capacity. Using a “search conference” in the Monongahela National Forest (MNF), social learning facilitated of a framework that can be used to inform the management systems for the future with the help of different interest groups. Through this process, the participants learned from each other’s concerns, and built trusting relationships (Selin et al, 2007), thereby increasing the knowledge and networking capacities. The IntECR (Integrated Education, Collaboration and Research) concept embraces blended learning and incorporates a university course-based instruction that may integrate Flood Risk Management (FRM), as implemented in Lakes Vänern and Mälaren, Sweden (Johansson et al, 2013). Through this, the IntECR concept helped “shared problem identification” (Johansson et al, 2013, p.25), especially in providing direction for a site-specific in local FRM. With the IntECR, it increased network and knowledge capacities within the lake regions. These just show that social learning can
take many forms and reach a variety of audiences from different fields. Therefore, social learning has been effective at enhancing social capacity and should be employed.

VIII. Conclusion

As flooding will be a recurring event in southern Alberta, especially High River, it will also be increasingly unpredictable due to factors of climate change. Though flood vulnerability has provided an integrated approach in which it highlights economic, physical and social vulnerability, it still has failed to determine the social connections in the social-ecological system (SES). This paper then argues that an understanding of lack of social capacities should be viewed as part of vulnerability assessment.

Though there is a robust and integrative system for flood management on a regional level, majority of the flood risk management in High River is viewed in a technocratic manner. There is a necessary shift from an equilibrist to an evolutionary approach of resilience, but this also requires an inclusion of a broader stakeholder network and consideration of residents of High River as “protagonists in risk reduction.” (Bender, 2011, p.79). Though this may encourage a “privatisation of risk”, this should not excuse the state or governments inactive with respect to flood risk management (Werg et al, 2013). Developing social capacity at the community level will arguably reduce vulnerability and augment community resilience.

Role of Planning in Social Capacity Building and Social Learning

This research paper contemplates on the roles of planning for building social capacity in flood risk management. It has been stated before that planning is “situated to strengthen social capital” but also helps generates public trust (Putnam et al, 2004,
p.144). With this in mind, planning can then be used to increase social capital, enhance social capacity and build community resilience.

Arguably, planners can use the principles of social learning as an approach for collaboration and mixed management. Lichterman (2009) supposes that the “state”, or in this case the municipal planning department, can “promote citizen’s social capacity, especially when it gives individuals social space for public discussions.” (p.862) Bearing this in mind, the municipal planning division can serve to provide the platform for these discussions and use social learning as a method of facilitating discussions for flood risk management. Planners can include and invite of different community groups, NGOs, municipal departments into the “social learning table” and cultivate trust within the community. Through this then, social capital and social capacity can then be developed to bolster community resilience.

Though social learning with the help of planning may seem to be a great idea, it may need to go through hurdles before its potential can be fully realized, especially in flood risk management. White and O’Hare (2014) warn us that “although planning is well placed to pursue the opportunities that disturbance offers and facilitate the collaboration necessary for more evolutionary understanding…”(p.945), its “novelty” may be a stumbling block. The implementation of social learning is essentially a political and economic game in which decision-makers and policy-makers, where time and money is used as costs. In the face of uncertainty and complexity, the social learning may, in fact, facilitate difficult discussions and collective action, but its effectiveness, efficiency and implementation are up to those who have the power to make the decisions.
IX. Recommendations

In order to develop and implement flood risk management, it should start with an inclusive and participatory approach to planning. This means that flood risk management should involve participation of (provincial and municipal) government staff, NGOs and community leaders. As mentioned above, social learning can promote discussions or information-sharing and collective actions with a wide variety of audiences and perspectives in the face of complexity and uncertainty. Based on the findings, this research paper recommends to implement social learning in order to:

1) Include the community of High River in the decision-making process, especially in flood risk management

2) Increase the flow of information-sharing among stakeholders

3) Increase transparency, communication and coordination among stakeholders (municipal and provincial government, NGOs, community) in different phases of the disaster cycle

4) Determine and assess different initiatives, programs and resources available for the community of High River.

5) Consider a variety of perspectives from governmental staff to NGOs

6) Broaden social networks that will increase capacities during response, mitigation, recovery, and preparedness phases.
X. Reference Cited:


Scott, M., White, I., Kuhlicke, C., Steinführer, A., Sultana, P., Thompson, P., Minnery, J., O'Neill, E., Cooper, J., Adamson, M., and Russell, E. (2014). Living with flood risk/The more we know, the more we know we don't know: Reflections on a decade of planning, flood risk management and false precision/Searching for resilience or building social capacities for flood risks?/Participatory floodplain management: Lessons from Bangladesh/Planning and retrofitting for floods: Insights from Australia/Neighbourhood design considerations in flood risk management/Flood risk management – Challenges to the effective implementation of a paradigm shift. *Planning Theory and Practice* 14(1): 103-140.


Appendix I. Type of questions that were asked in the interviews

1) In what municipal department/agency or organization do you work for? What is main role of the department?

2) What is your position in the department/agency or organization and what are your roles and responsibilities?

3) a. Do you work closely with the government of Alberta?
   b. Do you work closely with the municipal government?
   c. Do you work closely with the community?
   d. Do you work closely with the planning department?

4) What initiatives or programs do you have currently, with respect to flood management? To what extent do these involve restoration?

5) Where does the department get the direction in decision-making or to which project initiative should it undertake? What do you consider in your decision-making?

6) Do you involve the community in decision-making? How often?

7) Is your municipal department/agency or organization involved in flood management or water resource planning (emergency response, policy or planning, recovery and rebuilding)?

8) Would you consider your division to be more on flood response, flood mitigation or flood recovery?

9) What challenges did you face during your time working for the department?