The Social Construction of Vulnerability to Flooding: Perspectives and Values from the Red River Basin

By

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A Thesis
Submitted to the Faculty of Graduate Studies
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ABSTRACT

In the last two decades there have been efforts to advance human understanding of social sources of flood vulnerability in an attempt to reduce the high social and material costs of flood events. This study explored social sources of vulnerability by examining both community and institutional values and perspectives as they relate to flood risk and mitigation in the Red River Basin, Manitoba, Canada. To that end, the following objectives were considered:

- To review local mitigation decision-making processes, and describe the relative emphasis on structural and non-structural measures in the Red River Basin
- To explore identified mitigation activities and decision-making processes within the context of vulnerability reduction approaches to hazard management
- To describe community and institutional perspectives, values, and perceptions of vulnerability, and determine their roles in creating social vulnerability
- To recommend how to counter some of the key sources of social vulnerability in the Red River Basin based on the findings from this research

The case study research was conducted in two small rural communities in the southern part of the Manitoba portion of the Red River Basin; the communities were Ste. Agathe and Emerson, Manitoba. Ste. Agathe is a small francophone town located 40 kilometers south of the City of Winnipeg. It severely flooded in the Red River flood of 1997. Emerson is located at the Canadian-American border, 90 kilometers south of Winnipeg. It was spared inundation in 1997 due to the ring dike that surrounds the town.

Qualitative methods were used for data collection at the individual and community level. A community survey was conducted in both communities on flood-related issues, community organization and decision-making. A smaller group of participants from each community participated in a visual research method in which they were asked to photograph objects / places / people which symbolized community values / priorities or had special meaning in the context of living with the ongoing flood threat. Individual interviews were held with each

photography participant, and focus groups were held within the two communities to validate findings related to community perspectives and flood risk management.

Qualitative methods were also used to identify institutional values and norms related to flood management decision-making in the Red River Basin. These methods included qualitative analysis of documents related to flood risk management, and key informant interviews with representatives of agencies and institutions engaged in flood management issues in Manitoba. ATLAS.ti (2000) qualitative software was used to facilitate data analysis.

Vulnerability frameworks were applied to interpret community and institutional research findings and to identify key social, political, and economic factors that influence flood vulnerability and the quality of mitigation decisions. An adaptation of the Pressure and Release model (PAR) of disaster (Wisner, Blaikie, Cannon, and Davis, 2004; Blaikie, Cannon, Davis, and Wisner, 1994) was developed using identified contributors to vulnerability in this context. The study revealed that vulnerability in the Red River Basin is in part the result of the inadequate interactions between communities and decision-making authorities with regard to flood risk management, a dominance of institutional responses to flood, and a dependence upon technocratic approaches in assessing and responding to flood risk. Furthermore, identified barriers to vulnerability reduction included a lack of political leadership and commitment to flood vulnerability reduction over the long term, and entrenched community and institutional beliefs about the respective roles of senior government and communities in flood mitigation which fail to promote resilient communities.

Four recommendations were made on how to enhance capacities to reduce flood vulnerability in this context. They included: address weaknesses in public perception of flood risk and the role of stakeholders in reducing vulnerability; expand the use of nonstructural measures through improved leadership and use of more diverse tools for economic and social assessment of mitigation alternatives; develop policies to enhance a proactive role for government in vulnerability reduction and to provide incentives to local communities to take responsibility for the assessment and addressing of local vulnerabilities, and; ensure long

term political commitment that will provide both a vision and funding for flood mitigation and vulnerability reduction activities in the Red River Basin. These conclusions highlight the need for concerted efforts to address social, economic and political contributors to flood vulnerability in the Red River Basin if communities are to become more resilient to flood hazard.

ACKNOWLEDGEMENTS

When something has consumed so much time and energy, it is hard to see it come to an end. As I reflect back, I realize that this phase of my life would not have been possible without the support of so many people, both in my 'professional' life and in my personal one.

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CHAPTER 1: INTRODUCTION

1.1 The research problem

In Canada the human desire to occupy floodplains, putting life and property at risk, has resulted in a high level of vulnerability to flood (deLoe, 2000). Recent large scale floods in Canada have served as a reminder that vulnerability to this type of hazard remains significant even in the face of enhanced communications, advancements in the science of prediction, and considerable financial and technological investment in costly infrastructure to protect human settlements. Floods have been widespread throughout Canada, draining the tax base both federally and in individual provinces, and causing business disruption and economic stress. Floods have also strained social support systems, causing immeasurable stress and disruption to many families and communities, and, resulting in property and infrastructure damages, injuries, and even deaths (Pearce, 1997; Morris-Oswald, Simonovic and Sinclair, 1998; deLoe, 2000; Morris-Oswald, 2001). There is no evidence that the trend will discontinue, and the implications of global warming for increased hazard events fuel concern about future flood disasters. There are also concerns about continued growth and development in floodplains interfering with natural systems and ecological processes (de Loe, 2000) and highlighting that human behavior is a contributor to the problem of flooding. In general, unsustainable land uses and development practices may often make a sizeable contribution to floods, and may increase vulnerability to disaster through promotion and adoption of unsustainable survival and coping strategies in the face of a flood hazard (Uribe, Shigeo, Cuero, Franklin and Girot, 1999).

Flood events become actual disasters for many reasons, some related to the physical characteristics of the flood (size, duration, etc), and others related to human / social factors. *Disasters* are primarily defined according to the vulnerability of human groups that are exposed to the event. That vulnerability is in turn affected or determined by a number of factors. Two frequently-cited categories of factors include the level of 'risk' at that location (particularly the probability of occurrence of the hazard event and likelihood of damage) and conditions that contribute to social vulnerability.

'Social vulnerability' as a term includes a wide range of social, economic and political sources of vulnerability within a community or society (Blaikie, Cannon, Davis and Wisner, 1994). Social vulnerability to hazard is most easily understood in the context of the developing world where for example, poverty, population growth, and marginalization of some groups within society mean: 1) people live in less secure physical environments; and, 2) they have less access to resources should a hazard event occur. It is thus not surprising that much research on vulnerability has been done in poor nations. In a general sense, the vulnerability approach has as a goal to identify the (often) more subtle processes that can both directly or indirectly influence loss and hardship among human groups exposed to a hazard. They include for example, the nature of people's relationship with the environment, local knowledge of the hazard, local adaptive strategies, local decision-making processes, and the role of powerful institutions in determining the interpretation of and response to disaster, including distribution of risk. These processes are highly complex and exist at multiple scales. These are also the same processes that are frequently overlooked in decision-making when expedient solutions to flood risk are sought and adopted by decision-makers. They also can limit or enhance communities' capacities to be sustainable.

Hazards such as floods are managed within a broad context of social, political and economic forces. For example, economic and political forces at multiple scales may be implicated in encouraging livelihood activities in hazardous zones like floodplains. At the international policy level, there are international agreements (such as the Boundary Waters Treaty between Canada and the United States) that urge multi-partisan cooperation in developing hazard mitigation strategies. Specific to flooding hazards, at national and regional levels there are policies developed to manage, for example, development in flood-prone zones. At a very local level, flood level mitigation activities may be focused upon either technocratic solutions to risk, or upon broader holistic policies and strategies that seek to promote sustainable communities. Such policies and activities, and the judgments and values upon which they are based, greatly influence vulnerability; they can provide incentives or disincentives related to how flood hazard is managed.

Vulnerability has been defined in various ways within the literature, with the definition often reflecting to a greater or lesser extent the discipline of the author. A definition of 'vulnerability' suitable to this research refers generally to "characteristics of a person (or group) in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a hazard" (Blaikie, 1994, p.9). When people are vulnerable to a hazard it can threaten their lives, livelihoods, property, infrastructure, economic productivity, natural resources and regional prosperity (Uribe et al., 1999). The responses they adopt to handle the risk can, in turn, have long-term implications for the sustainability of their communities.

In the last two decades there has been more attention to and analysis of vulnerability – particularly social sources of vulnerability – in an attempt to reduce the high human and material costs of flooding. Questions that are fundamental to vulnerability analysis include *who* and *what* are at risk and in *what ways* (Natural Hazards Research and Applications Workshop, 1999). This has precipitated a movement away from traditional hazard studies with their focus primarily on hazard agents and individual responses, to more consideration of the community level of response and adjustment (Jones and Shrubsole, 2001). There are attitudes at a community level that can encourage or discourage adoption of a wider range of hazard management strategies (Tobin and Montz, 1997) that need to be better understood to address vulnerability.

For the purposes of this research 'community' is best articulated through the notion of connectedness to both a place and to the social webs that communities provide. Friedman (1996), in conducting research into the definition of community, quoted a respondent who said "community is a state of mind, but it is intimately tied to public place. The sense of community flourishes when the public place provokes pride and identity" (p.3). This connection simultaneously to a common landscape and to fellow citizens (Beatley and Manning, 1997) encapsulates the notion of community in both geographical and social terms. Furthermore, the decision in this research to conduct much of the analysis at the community scale was influenced, in part, by the notion that a 'community' is the smallest managerial unit that can make independent and indivisible decisions relative to which adjustment to a hazard are adopted (Kates, 1971).

In relation to exposure to risk, community ideology and activity influence individual perceptions and behavior, and communities respond to hazards based upon the wider context of conditions and pressures that exist - whether they are social, economic, political, or cultural (Jones and Shrubsole, 2001). These factors then are key to understanding how members of communities organize to reduce their flood vulnerability, and what mitigation measures they adopt and which ones they reject.

Governments have a key role in managing vulnerability and response to hazards, whether natural or human induced. Historically, public policy related to hazard management has reflected early flood hazard research practice. Its focus was on mitigation, preparedness, response and recovery (Jones and Shrubsole, 2001). This focus used much traditional science (where causes and solutions are relegated to discrete measurable aspects of disciplinary inquiry) to predict the consequences of hazards, to organize response plans, and develop mitigation options, but it had some serious limitations. The chief limitation in the case of flood hazard was that this approach failed to reduce losses and hardship from successive floods. Perhaps this limitation existed (and exists) because hazards, as agents of harm, cannot be perfectly understood, nor can the consequences of mitigation activities be reliably and accurately predicted. Or, more importantly, how people live, where they live, what they do, and how they are likely to be impacted by a crisis are less dictated by science than by their social circumstances including their values, culture, and worldview. Increasingly in environmental literature, the objective aspects of hazards (primarily quantitative physical sciences) and the subjective aspects (related to social science concerns) are seen not so much as dichotomous but rather as interwoven characteristics of complex human-natural systems (Hewitt, 1997; Stefanovic, 2000).

Vulnerability models, with their inclusion of social sources of vulnerability, work best where the social circumstances of people are well-understood. Yet recognizing that social factors greatly influence hazard response does not mean they are easily identified and evaluated. Social factors vary (to greater and lesser degrees) from community to community, culture to culture – making broad theoretical models of behavior poor predictors of both human actions and the likely impacts of a disaster. These factors are, however, crucial to a vulnerability

approach to hazard studies, especially at a local level. Vulnerability is thus highly contextual (Jones and Shrubsole, 2001; SEI, 2002).

It is through targeting social processes that vulnerability frameworks attempt to identify, and begin to put into a context for understanding, the levels of risk and likely outcomes from hazard events. Yet, in Canada, typical assessments and responses to flood risk do not take into account many sources of vulnerability. Decisions are made with reference to physical sources of vulnerability, with limited consideration of vulnerability that results from social processes and characteristics- such as commonly-held values, priorities, and problem-solving strategies. It may well be that vulnerability is in fact exacerbated when community characteristics are ignored and little consideration is given to mitigation options that include social interventions; instead, short-sighted engineered structural approaches tend to dominate which, in the case of flood hazard, can encourage development in unsafe areas (Tierney, Lindell and Perry, 2001).

Mitigating flood risk has traditionally been done in one of two forms- through either structural or nonstructural measures. Current flood management policy, and the common application of cost benefit analysis in selection of mitigation options, comes down heavily in favor of structural measures as the alternatives of choice. Structural measures such as dikes, reservoirs, dams, floodways etc., all modify natural processes and include construction of control devices (Jones and Shrubsole, 2001) based upon engineering analyses. They are also highly amenable to traditional cost benefit analysis. These structural measures are in contrast to nonstructural ones which focus instead upon social interventions, attempting to modify human behavior within the hazardous environment in order to minimize damages. Nonstructural measures include such widely diverse activities as relocation of settlements, land use regulations, insurance, education programs, and warning systems. They are often more dependent upon fostering a receptive community attitude with regard to flood damage reduction and upon justifications that are not expressed in purely economic terms. For instance, justifications for new building restrictions in an area may be difficult to make in traditional cost benefit terms. Yet the justification may be possible if the analysis applies a longer time frame and includes the enormous psychosocial costs of a large future flood.

Conceptual frameworks and vulnerability typologies, which identify factors (including social ones) contributing to vulnerability to hazard, have been developed (Winchester, 1992; Blaikie et al., 1994). These have helped in the analysis of vulnerability, including attempts to identify the complex causes and effects of vulnerability beyond the mere physical forces at play. Yet it is common practice in Canada to address the physical aspect of flood hazards without the social dimension which leads to short-sighted unsustainable approaches with potentially alarming long-term consequences.

1.2 Context of the research

The Red River Basin is a suitable site for this case study for several reasons. There is a long history of flooding in the Red River Valley; the communities along the Red River recently experienced the 1997 'flood of the century' with damages in excess of $600 million dollars (Cnd), and there have been recent major flood mitigation decisions made. Furthermore, the International Red River Task Force provided reports to the American-Canadian International Joint Commission (IJC) in 2000 (IJC, 2000a; IJC, 2000b), which reviewed the events of the 1997 flood and made some very specific recommendations to improve flood preparation and response on both sides of the border. They stated the necessity of further research into a number of flood-related issues in the Basin including the importance of fostering flood resilience, and the implications of the 1997 flood on community and social identity.

1.2.1 Flooding in the Red River Basin

Manitoba is a prairie province located at the center of Canada. It has a population of approximately 1.14 million people, with over 670,000 living in the largest urban center, Winnipeg. Historically, the Red River Settlement, at the confluence of the Red and Assiniboine Rivers, was settled in the early 1700's for the purpose of conducting the lucrative fur trade. This was followed in the later 1800's by extensive immigration from Europe by pioneers in search of arable land. In the southern part of the province, the Red River provided incentive for these early European settlements into the area (Haque, 2000), as the river was a source of water for households and livelihood activities (particularly agriculture) and initially served as a transportation route. Over many decades inhabitants

along the Red River became accustomed to the threat of high water in the spring, but not total inundation (Bumsted, 1993).

Today most of the population of the province of Manitoba is originally from (or descended from people who emigrated from) various European countries. High numbers of German-speaking Mennonites and Hutterites live in many southern communities characterized by intensive agricultural production. French Canadian communities also exist in areas of the province, and there are a large number of aboriginal (First Nations) people, settled in urban centers and rural reserves. These settlements are predominantly in the northern areas of the province.

The importance of water management in the province is exemplified by the fact that three-quarters of Manitobans live in areas of the province known for their history of extensive flooding (Manitoba Conservation, 2001). There are five principal rivers in the province, including the Red and Assiniboine rivers in the southern part of the province. The Red River flows northward, originating in Wahpeton, North Dakota and flowing northward for 885 km. It meanders through North Dakota, northeastern Minnesota, and southern Manitoba to finally end at Lake Winnipeg. The Red River Basin has an unusually flat topography. The river has a slope of less than 0.1 m/km on average, and has a shallow riverbed. The result is that, under flood conditions, waters spread largely unimpeded across the landscape. The Red River has several tributaries, of which the Assiniboine River is the most significant. The drainage area of the Red River increases from 124,300 to 287,500 square kilometers where its tributaries drain together.

The greatest concentration of damages in Manitoba from the 1997 flood occurred between the capital city of Winnipeg and the U.S. border to the south. This southern region encompasses eight municipalities along the Red River. While the extent of flooding in 1997 varied in each municipality, the average amount of land area in each that was flooded was 43% (Buckland and Rahman, 1999). In the municipality that received the most damage in 1997 (Ritchot), roughly half of the houses were damaged [circa 800] (Buckland and Rahman, 1999). There was one aboriginal reservation directly affected by the 1997 flood – Roseau

River First Nation. They received extensive damages; roughly 56% of the 204 homes on the reserve were flooded (CHMC, 2006).

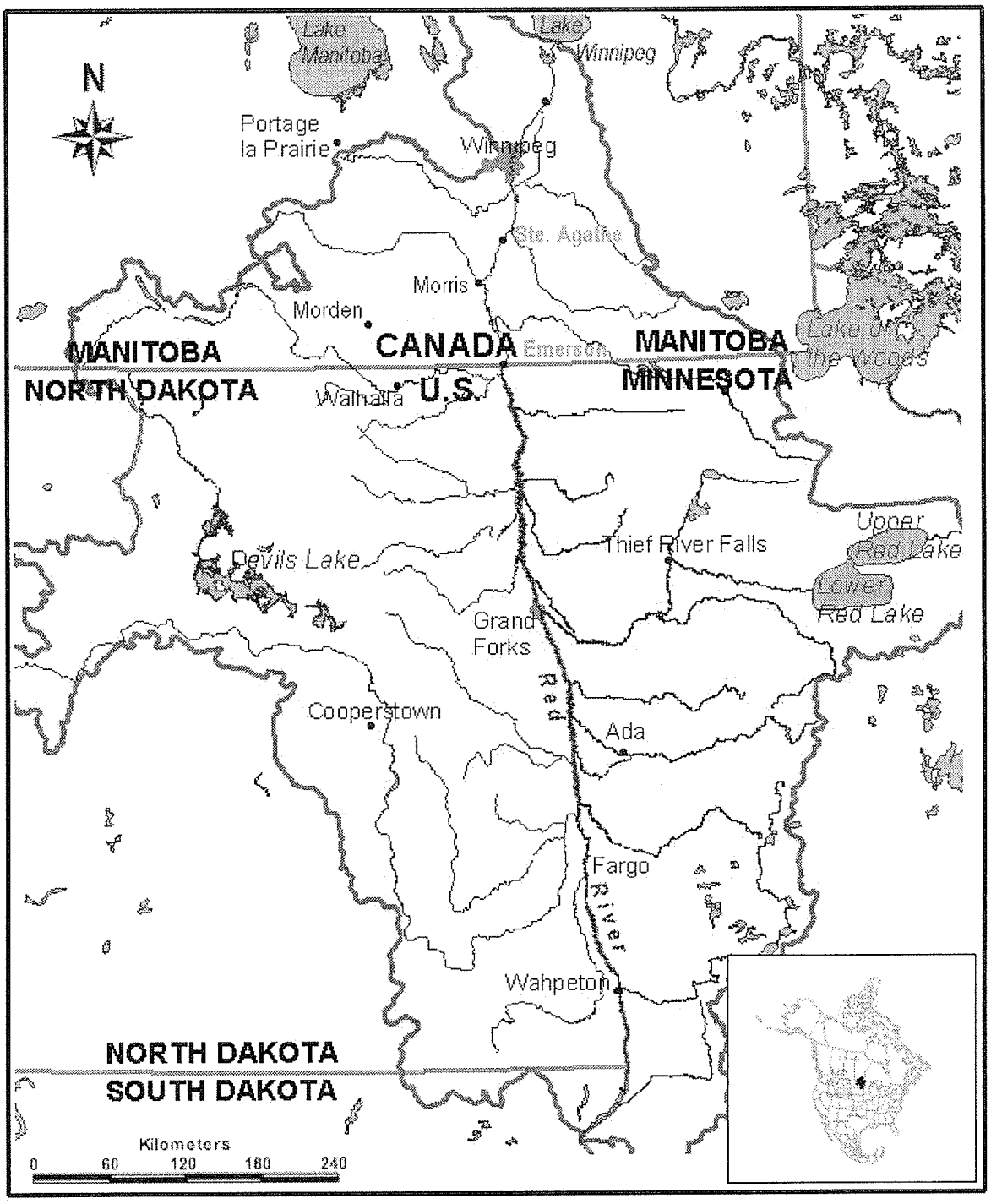

Figure 1.1 – The Red River Basin
(adapted from RRBDIN, 2006)

Location map for the Red River Basin. Map has been copied and adapted with permission from the Red River Basin Decision Information Network (RRBDIN). http://www.rrbdin.org/data/lidar.jsp. February 23, 2007. Resale or further copying of this material is strictly prohibited.

1.2.2 Responses to flooding

In the last fifty years there have been six major floods, i.e., greater than 80,000 cubic feet per second (cfs), in southern Manitoba – in 1950, 1966, 1974, 1979, 1996, and 1997 (Doering, 1997). In recent decades, as both the population and economic investment in Basin communities have increased, residents of the valley have sought to protect their property and livelihoods from excessively high water levels through two key activities: artificial drainage measures to quickly remove water from agricultural land, and construction of structural flood mitigation measures to alter the flows of water away from populated areas (particularly town dikes). The latter community level initiatives are done under the leadership of the newly named Water Control Infrastructure Section (WCIS), formerly Water Resources Branch, of the newly created Manitoba Water Stewardship Department of the provincial government.

Even at a household level, it has become more common to increase preparedness through construction of small dikes, elevation of buildings above the 100-year flood level, or construction of temporary sandbag dikes around homesteads during a flood event. This is in some contrast to just fifty years ago, at which time removal of possessions and evacuations of residents were the principal household flood damage mitigation strategies (Buckland and Rahman, 1999). For example, after the 1997 flood, Water Resources Branch (now the WCIS) supported and offered funds to assist residents in construction of private dikes and other flood-proofing activities to bring private properties up to the 1997 flood line plus 0.6 meters (two feet) flood protection level.

In 1997 there were eleven southern communities with partial or complete permanent dike systems, with almost an equal number of temporary ones put in place as the event unfolded. Many of these communities now have permanent town dikes. The City of Winnipeg was saved from extensive damages in 1997 through the operation of the 'floodway' around the city. This large infrastructure project, completed in 1968, diverts floodwaters from the Red River around the city in an alternate 45 km channel, and deposits it north of the city limits (Morris-Oswald, 2001). It is currently undergoing a major expansion to bring flood protection in the City to the 1/700 year flood level. In 2003-2004, the original budget for the expansion was $665 million (Cdn), but the floodway authority recently had to increase

funding by $135 million to meet rising construction costs. The funding challenges are a result of both dramatic cost hikes and a lack of full commitment by the Federal government to pay for half of the costs of the expansion. In terms of structural mitigation within the City, there is also a system of primary and secondary dikes to protect physically vulnerable areas of the city during flood conditions.

Existing flood planning strategies in Manitoba involve both structural measures and organizational methods (Haque, 2000). These strategies became particularly dominant following the 1950 flood which cost about $42 million [1950 dollars] (Bumsted, 1993), and resulted in a total of 125,000 evacuations from both Winnipeg and southern communities (Bumsted, 1997). Structural control works, under the auspices of the provincial government, became a prevalent means of mitigating damage in the Basin. After the 1950 flood, the 1958 Royal Commission on Flood Cost-Benefit Analysis was assigned the task of determining how to reduce future damages from flood. They focused on structural engineering works and traditional cost-benefit analysis in their assessment. Ultimately a series of strategic measures were proposed such as the impressive Red River Floodway, a diversion channel at the city of Portage la Prairie to divert Assiniboine River waters to Lake Manitoba, the Shellmouth Reservoir on the Assiniboine River to provide water storage, ring dikes in some vulnerable communities to the south, and extensive diking for the City of Winnipeg. Through the 1960's and 70's these recommendations came to fruition. The structural measures were funded through federal-provincial cost-sharing arrangements. In some of the cost sharing agreements, municipal governments also assumed approximately 5% of construction costs. In all cases, the necessary engineering design work and supervision of construction were undertaken by what is now WCIS (previously the Water Branch of Manitoba). In the years following their construction they have served their purposes well, averting considerable damages and suffering.

1.2.3 Institutional arrangements for floodplain management

Floodplain management involves a multitude of agencies in Manitoba, and all three levels of government. Many only become involved in a flood crisis. WCIS (Water Resources Branch in 1997) bears the bulk of responsibility, actually administering multiple Acts with a wide range of responsibilities such as forecasting, operation of the flood control works, monitoring flows, dissemination of floodplain and flood information, and development and monitoring of flood-proofing programs. WCIS also have a Regional Operations group that is responsible for field activities, enforcement of legislation, emergency response to floods and delivery of services at a community level. It is the Regional Operations group who provide security to diked communities and search and rescue operations. The key provincial Act they administer is the Water Resources Administration Act, a very complex piece of legislation. One important provision of the Act since 1997 stipulates that there should be two-stage inspections of buildings under construction in the floodplain to ensure they comply with flood proofing criteria set out by the province (1997 flood line plus 0.6 meters). Another key provision permits the Minister (of Water Stewardship) to remove structures that do not conform to flood-proofing criteria. However, politically, the removal of structures from privately owned property has never to date been seen as defensible (Whitney, 1999).

The Dyking Authority Act, also administered by WCIS, gives powers to a Dyking Commissioner who is appointed by the provincial government to supervise and inspect flood defence works specific to the City of Winnipeg. The City of Winnipeg Act also gives the City Council general powers and duties to take action related to flood or other disaster. All municipalities, or specifically municipal councils, are granted powers through the Municipal Act which allows them to both take actions during times of emergency and enforce their own by-laws to regulate or prohibit activities or development in the floodplain. They are expected to handle local crises, including flood events and damages, until they have exhausted their own resources. At that point there are legislative provisions for them to formally seek assistance from senior governments.

Flood mitigation falls under all three jurisdictions – federal, provincial, and municipal, with the senior governments assuming a large part of the cost for major structural initiatives (such

as those noted earlier) through various cost-sharing agreements. However, even with the intensive construction of control works that characterizes the Red River Basin and other regions in Canada, damages have escalated with successive events, straining federal budgets. Historically, it was in 1975 that the federal government, out of frustration with escalating flood damages, began to seek a broader range of options to reduce and respond to flood risks other than exclusively structural ones. Hence, a federal Flood Damage Reduction Program (FDRP) - under Environment Canada - was created, shifting the management emphasis from exclusively structural measures to include new initiatives in floodplain mapping and warning systems, land acquisition, plus an expressed intent to 'encourage' local municipalities to enact floodplain regulations such as zoning regulations, building codes etc. These were non-structural approaches. The federal government program also stipulated that it would not build, approve, or finance inappropriate development in the floodplain nor provide disaster assistance for such development. However, according to Shrubsole (2000) failure to actually enforce and nurture such activities as local floodplain regulations has been a serious impediment to flood mitigation in Canada generally; the Red River Basin was no exception as seen in 1997 (Morris-Oswald, 2001).

Of additional concern is the fact that since the late 1990's, the FDRP has been essentially defunct. No new level of government has assumed responsibility for floodplain management, and there has been no comprehensive new flood management program or vision put forward to replace the FDRP (Shrubsole, 2000). Institutional arrangements for floodplain management remain fragmented across Canada (Shrubsole, 2000), contributing to flawed, unsustainable decision-making.

When it comes to emergency preparedness activities, Public Safety and Emergency Preparedness Canada (PSEPC) and its provincial counterparts (such as Manitoba Emergency Management Organization [MEMO]), have the most important role to play in flood management. The Emergency Measures Act empowers the Lieutenant Governor in Council to appoint an advisory committee to recommend emergency preparedness plans and programs (Haque, 2000) Assessment of damages, compensation, and administration of the Disaster Financial Assistance Arrangements (DFAA) also fall under the jurisdiction of

MEMO. The DFAA is a per-capita cost sharing formula (provincial-federal) for eligible expenses following a disaster. In 1997, MEMO administered the contentious program, assessing damages and determining compensation arrangements for both community infrastructure damages as well as personal damages sustained by residents.

After the 1997 flood, complaints and disputes about the process, amount, and nature of flood damage compensation were common (IJC, 1997; Morris-Oswald, 2001). Ill-will towards government authorities was also compounded by a belief held by some residents south of the floodway that operation of the floodway (to save Winnipeg) artificially raised water levels on their properties, causing additional damages. Other residents resented the evacuation orders requiring that they abandon their efforts to save their personal property (through maintaining temporary dikes, pumping water, etc.) in order to comply with the orders.

The task of preparing emergency response plans has been assigned to local governments by the Manitoba government (Haque, 2000). Local governments are also required to have a committee of community members to advise on such a plan. Yet, according to Shrubsole (2000), municipal governments have generally been excluded as meaningful partners in most flood management plans, limiting local expertise. Local governments rarely have the necessary resources to develop and implement emergency plans. As a consequence, there is a differing range of preparation from community to community in the Basin (Wachira and Sinclair, 2005). In general, comprehensive grassroots emergency response plans, implemented at a community level, often suffer from a lack of investment, support, and direction from senior governments (PERI, 2001). There is evidence of a need for senior levels of government to supply ongoing support (both technical assistance and personnel) to local communities if disaster reduction goals are to be realized (PERI, 2001).

The issue of multi-level partnerships, and specifically the role of public involvement in mitigation decision-making in Manitoba, has recently come under scrutiny as a result of research being conducted in the Red River Basin (Sinclair, Diduck, Morris-Oswald and Olczyk, 2003). Results suggest some dissatisfaction amongst residents of the Basin with current floodplain management decision-making practices. The public appears desirous of a

more active role in mitigation decision-making. For example, there appears to be a preference for more public consultation at the municipal level, consultation at all stages of deliberation over vulnerability reduction strategies (not just the end), and more public education on the issues critical to effective decision-making.

The above discussion of the context of flood and floodplain management in the Red River Basin provided a backdrop against which this research was conducted, as did the issues raised in the aftermath of the 1997 flood. The 1997 flood event had been somewhat characterized by disagreements and conflict, not an uncommon occurrence in Canada (Haque, 2000); much of the conflict was between 'experts' within government agencies, and the people of flood prone areas. It suggested a need to better understand the differing perspectives of government agencies and community residents with regard to flood vulnerability and how to mitigate harm. The aftermath of 1997 was also followed by significant efforts to try to understand what happened to cause the level of devastation seen, and to improve planning capacities (IJC, 2000a; Manitoba Water Commission, 1999). Therefore at the onset of this research it was evident that there was a lack of a continuing vision for sustainable floodplain management in Manitoba (and Canada), a discernable and potentially worrisome dominance of structural measures, and a lack of both the will and the means for addressing community and regional vulnerability to flood. This failure to address some aspects of flood vulnerability, and particularly social sources (as opposed to physical sources) was the impetus for this research. In addition, as seen in this context, flood management in the Basin, with highly complex institutional arrangements, has not been able to truly facilitate a cooperative mutual relationship between senior government decision-makers, local municipalities, and Basin residents.

1.3 Research objectives

The purpose of this research was to better understand the relationship between community perspectives- beliefs, attitudes, values-, floodplain management and mitigation decisions in the Basin, and community vulnerability to flood. The emphasis from the outset was on investigating social vulnerability as opposed to physical vulnerability to flood. While both sources of vulnerability are seen to work in tandem to create the potential for a disaster to

occur, social sources of vulnerability have not been given sufficient attention (Blaikie et al., 1994).

This research considered such issues as community priorities and vision for the future, perceptions of vulnerability, community activities related to flood management, how local mitigation decisions are made, institutional perspectives and values, and why structural measures have such appeal. Particularly, linkages were sought between community and institutional perspectives, values, and decision-making and how those linkages might create vulnerability in this context. This research addressed the problem of flooding through the application of new knowledge about the social construction of vulnerability in the Manitoba portion of the Red River Basin.

To that end the following objectives were fulfilled.

Objectives:

1. To review local mitigation decision-making processes, and describe the relative emphasis on structural and non-structural measures in the Red River Basin
2. To explore identified mitigation activities and decision-making processes within the context of vulnerability reduction approaches to hazard management
3. To describe community and institutional perspectives, values, and perceptions of vulnerability, and determine their roles in creating social vulnerability
4. To recommend how to counter some of the key sources of social vulnerability in the Red River Basin based on the findings from this research

1.4 Overview of research methods

The achievement of the above objectives was done through qualitative (Creswell, 1994) research. The creation of social vulnerability must be examined within a real world context. The research required exploring multiple facets of social vulnerability and how they are created and linked. The qualitative methods (e.g., interviews, photo elicitation) were of particular value because the social vulnerability perspective relies heavily on context; it was

essential to use qualitative methods in attempting to understand how Basin residents make sense of community flood risk and respond to it. An interpretive approach (Maxwell, 1996) was used, employing a systematic analysis of text (e.g., conversation, written text, and photos) to arrive at an understanding and interpretation of how residents construct meaning in their experiences of everyday life. Overall, the study focused on understanding flood vulnerability by identifying not only how floodplain management decisions are made, but more importantly, by exploring what social perceptions, values and assumptions govern community level beliefs about vulnerability and about related decision-making.

An interdisciplinary approach was adopted in this research because vulnerability to hazards is found at the nexus of society, built environments, and extreme natural events. Vulnerability is the result of complex and dynamic interactions between natural, social, economic and political systems, and cannot be viewed from the perspective of fragmented disciplinary thinking. It was therefore essential to use an interdisciplinary approach which values the inclusion of a wide range of perspectives and sources of knowledge to examine complex problems. Consistent with interdisciplinary thinking, the component contributors to vulnerability in this context were viewed as overlapping, connected and mutually influential.

Primary data were collected from a number of sources within the Red River Basin. The research included a case study with two small Basin communities used as the cases. The first stage of data collection involved a detailed semi-structured survey of 48 residents across both communities, in which they were asked a wide range of questions related to local floodplain and flood management issues such as their beliefs about community vulnerability to flood, the nature of local organizations and networks, local leadership, and community participation in decisions related to mitigation of flood risk. The next stage of community research involved the recruitment of participants to engage in a visual photographic methodology designed to elicit more insights into community perspectives, values, and concerns about vulnerability, and thoughts about mitigating flood risk. The unusual visual methodology was adapted in part from Stedman, Beckley, Wallace and Ambard (2004) who investigated attachment to place within a Canadian community. Participants in this research in the Red River Basin were asked to take photos of 'items' -objects/places/people- to represent: 1) what

they perceive as important community values 2) their attachment to the town 3) concerns they have about flood vulnerability, and 4) sources of reassurance of security in the face of flood vulnerability (e.g., town dike). After the films were developed, interviews were held with each participant and the meanings of the photographs were recorded. Photo data were analyzed for key findings related to community vulnerability. A focus group discussion was conducted in each community to check the validity of findings. This was done by presenting (via PowerPoint slide show) a sample of photos and commentary from interviews for participants to discuss. At the conclusion of the research, each community was given a large poster of local photos taken and commentary by residents about the community and flood risk. They are now publicly displayed within the communities.

In addition to community research, a documentary analysis was done on a sample of documents available to the public on flood mitigation issues in Manitoba; this archival material included reports written from 1950 to 1999 by a variety of authors, primarily government personnel, consultants, and representatives of community organizations. The purpose of the analysis was to identify some of the perspectives and values exhibited in this time frame by key institutions and decision makers, and any evolution in thinking about flood vulnerability and mitigation. This helped fulfill the first objective of this research, related to how flood mitigation issues have been addressed and mitigation decisions made to date.

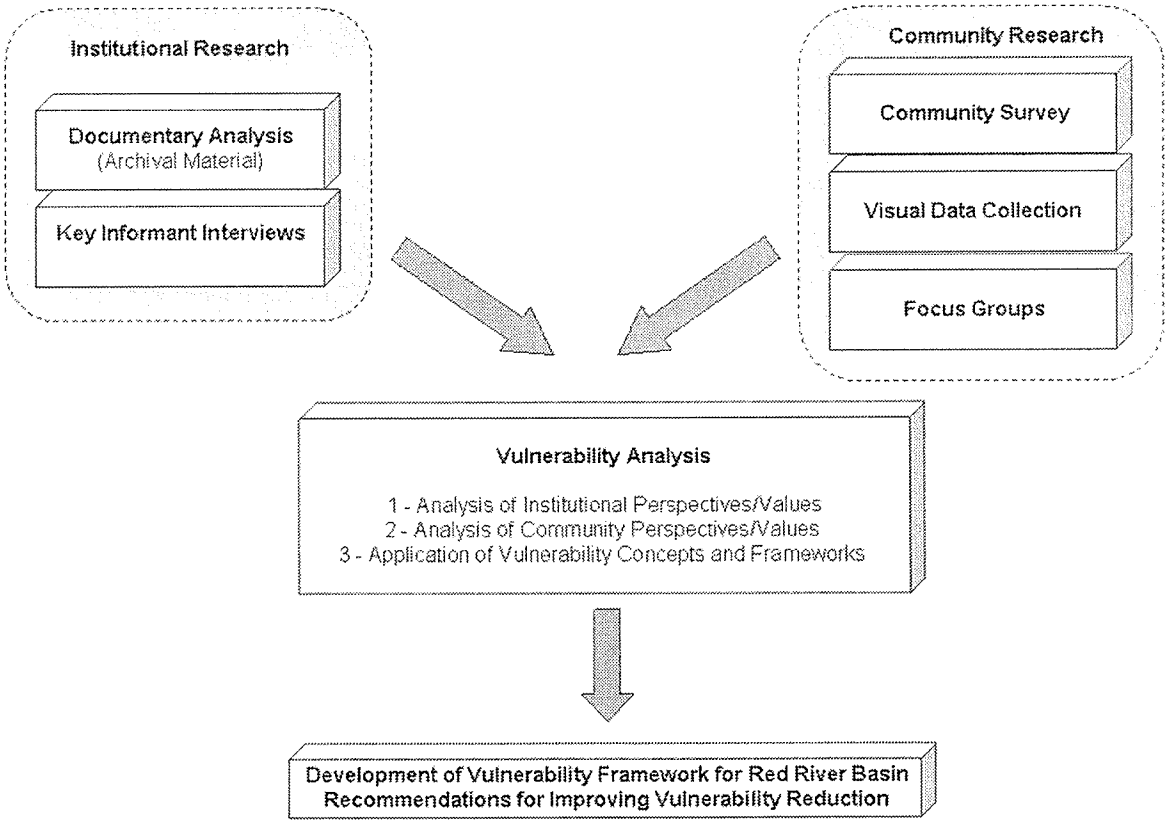

Figure 1.2 – Flow diagram of research methodology

Documentary analysis, more specifically qualitative content analysis, was selected as a method because it reveals aspects of the social context in which documents are created and then used as communication mechanisms – what is said and how it is said allows researchers to make inferences about what is important to the creators of the documents. Content analysis as a technique allows researchers to discover and describe the focus of individual, group, institutional or social attention (Weber, 1990 in Stemler, 2001). In this particular study it was also used to help identify important attitudes and values used by dominant institutions and decision makers in Manitoba with regard to vulnerability reduction.

In addition to documentary analysis of archival material, key informant interviews were conducted with government personnel, members of non-governmental agencies (NGO's), and local municipal decision-makers and activist groups to investigate their perspectives on floodplain management. These personnel, who represent the perspectives of their institutions or organizations, may be referred to as 'institutional gatekeepers' (Rokeach, 1979). They

were identified through direct contact with key organizations within the Basin. A list of the types of agencies/organizations represented in the research appears in Chapter 3, Section 3.4. Examples of information sought from key informants included their agency's or group's perspectives on how decision-making is done, how consultations are done with impacted communities, what variables influence mitigation decisions, what an ideal process for decision-making might be, what the priorities of communities are, and what barriers might exist to realizing sustainable floodplain management. The interview schedule appears in Appendix C.

Once the above data were collected, the achievement of objectives two and three required that findings be examined in the context of current thinking about the creation of vulnerability to flood hazard. In general, vulnerability frameworks seek to explain the variables that contribute to or are critical to the analysis of vulnerability. While numerous vulnerability frameworks were reviewed, one model offered particular guidance and insights in this analysis. The model was that of Wisner et al., 2004 - a more recent version of Blaikie et al.'s (1994) PAR model - which focuses on the pressures and processes that result in disasters through a 'progression of vulnerability'- essentially social vulnerability coinciding in space and time with hazard events. Particularly this framework emphasizes the interplay between root causes of social vulnerability (such as values, economic forces, governance, etc.), dynamic processes (such as decision-making, livelihood or other stresses, etc.), and resultant vulnerable conditions that are created by the aforementioned root causes and processes. This framework was applied in part, and in the Conclusion chapter it was adapted to show the progression of social vulnerability in the Red River Basin using the findings of this research. The vulnerability analysis component of the study considered the results of the documentary analysis of archival material, analysis of key informant interviews, and the empirical community data from the community surveys, photos, interviews and focus groups in exploring the social construction of vulnerability in the Red River Basin.

The final objective of this study was to make recommendations on how hazards / disaster vulnerability might be addressed in this context. Four recommendations were made as a

means of addressing some of the broader societal issues that attenuate vulnerability in the Basin (refer to Chapter 7, Section 7.5).

In conducting this research, the assumption was made that recommendations related to reducing vulnerability and improving mitigation required an understanding of some of the root causes of social vulnerability, specifically through exploring the perspectives and values of community residents and institutions. Decision making processes are dependent upon such social variables, and values in particular (Mangun and Henning, 1999). The findings of this research may very well have implications for improving responses to hazards of all types, particularly when shared with the appropriate authorities, communities, interest groups, and individuals.

1.5 Organization of the study

Following the introductory chapter, this thesis document is organized as follows:

Chapter 2 presents the literature review entitled: ***Vulnerability to Flood Hazard***. Exploring the notion of flood vulnerability as a social construction required a broad overview of literature on issues of relevance to floodplain management and mitigation decision making within the Red River Basin. Main areas of the relevant academic literature that are presented within this Chapter include : an overview of theoretical perspectives in hazards and disasters; conceptualizations of vulnerability in the natural hazard context; vulnerability reduction and creation through hazards, and particularly flood hazard; the role of structural and nonstructural mitigation measures in alleviating flood vulnerability; policy issues in mitigating flood damages; community levels of analysis of vulnerability, and the role of culture and values within flood mitigation decision making.

Chapter 3 reviews the ***Research Design and Methods***. Empirical data collection was performed in two major phases. One was related to a review of institutional perspectives and values on various aspects of flood vulnerability and community participation in decision making. The institutional analysis was based upon two activities: 1) documentary analysis and; 2) interviews with key informants from flood mandated agencies or other relevant

organizations. The second phase of data collection was at the community level and included: 1) a survey on flood vulnerability and local decision-making conducted with residents in two Basin communities selected according to a set of criteria which appears in Chapter 3; 2) use of a visual method utilizing photography and interviews within those same communities to garner community perspectives and values related to flood risk and mitigation, and 3) a focus group with participants within each community who took photos and participated in interviews, for the purpose of discussing and validating findings.

Chapter 4 is entitled ***Institutional Values and Perspectives***. It presents the findings from a review of a sample of documents relevant to flood and floodplain management in the Red River Basin during the period from 1950 to 1999. The review examined the thematic content of documents during the sixty year period including the two years immediately following the 1997 flood. This is followed by the results of individual interviews with key informants [also termed 'institutional gatekeepers' (Rokeach, 1979, p.53)] from within Basin organizations engaged in flood related activities. The final discussions in the chapter highlight major findings related to institutional perspectives and vulnerability, as well as a specific discussion of the values of government institutions.

Chapter 5 is entitled ***Survey of Community Perspectives***. This chapter presents the community survey data analysis. The results of the survey are organized according to themes that emerged from the data. This is followed by a discussion of what the findings reveal about community perspectives, priorities and values, their link to flood management issues and mitigation decisions that are made locally, and begins to explore their link to vulnerability.

Chapter 6 is entitled ***Capturing Community Flood Vulnerability through Photography***. The chapter discusses community characteristics, perspectives, and values that emerged through review of community photographs during individual interviews with residents, and the focus groups conducted with community participants. First, the central themes that emerged through the analysis of photos, interviews and focus group data are presented under several descriptive headings. The themes highlight issues that were discussed by residents in

reflecting upon the vulnerability of their communities to flood. These are followed by a discussion entitled 'Living with the Risk' that discusses the community sense of flood vulnerability as revealed through the photos. Finally, comments are provided on the use of photography as a method for exploring community values, perspectives on flood hazard, and community vulnerability.

Chapter 7 presents ***Conclusions and Recommendations*** related to ameliorating social vulnerability in the Red River Basin. Conclusions relate to how flood mitigation decisions are made, and what (and how) community and institutional values and perspectives influence how flood vulnerability is addressed in this context. A final framework entitled Progression of Vulnerability in the Red River Basin is presented that summarizes the findings related to social sources of flood vulnerability. This is followed by four recommendations on how flood vulnerability might be addressed in this context. A brief discussion of the contributions of this research completes the final chapter.

CHAPTER 2: LITERATURE REVIEW: VULNERABILITY TO FLOOD HAZARD

2.1 Vulnerability and natural hazards

2.1.1 Introduction

Natural *disasters* have been increasing in recent decades although there may be a lack of clear evidence that the actual frequency of extreme hazard events has increased (Yodmani, 2001). However, researchers worldwide have raised an alarm that human impacts upon the Earth system such as 'greenhouse gases' emitted into the atmosphere, may be causing the global atmosphere to warm, which means that both the frequency and/or severity of various extreme climatic events are likely to increase (Aspen Global Change Institute, 1996). Regardless of the final outcome of such debates as global climate change, disasters have been and will continue to be a threat to human habitation and activities, and even to human life. In the weighty words of Ulrich Beck: "ultimate security is denied to us human beings" (Beck, 1992, p.97).

The human *perception* that disasters have been increasing is primarily related to an observable increase in material losses and loss / risk to human life rather than to numbers of events themselves. In other words, hazards are defined as disasters only by the impacts on human life and human concerns. Losses have in fact been increasing in the last four decades (Etkin, 1999; Yodmani, 2001). This has led some researchers to conclude that at least one of the contributors to vulnerability is the (human determined) 'path of development' (Blaikie et al., 1994; Yodmani, 2001). Human use of environmental resources and the underlying values that lead to certain types of usage, including patterns of settlement, are then keys to understanding and reducing human vulnerability to natural disaster. This of course raises the question of whether there are in fact any truly 'natural' disasters, given that without people there are no disasters. Disasters occur at the interface of extreme physical events and vulnerable populations (O'Keefe, Westgate, and Wisner, 1976).

The human *vulnerability* approach, which considers disasters in a broad context, is in contrast to early studies of natural disasters that portrayed them as exceptional circumstances

that interrupted the social processes in a society. Disasters were viewed as essentially an aberration; the system was attacked by an external agent. And *recovery* was then a limited concept which merely required resumption of normal patterns of living (Hewitt, 1983; Zaman, 1999). Because of this treatment of the natural disaster as both aberrant and nuisance, the focus of geographers and sociologists from the 1950's - 1970's was to urge for development of mitigation measures, sharply focused on a 'technocratic approach'. Typically, mitigation took the form of disaster preparedness, emergency evacuation planning, relief, and rehabilitation efforts. It generally ignored the issue of *vulnerability* (Zaman, 1999) and did not seek explanations for vulnerability beyond the issue of place and exposure. Intervention focused on reduction of exposure, or barring that, on reducing stress and providing services to victims, and rebuilding as necessary after the event.

The concept of vulnerability as applied to exposure to natural hazards – such as floods – therefore has evolved only over recent decades. It is fair to say that the concept of vulnerability, in Canada and elsewhere, has become an important component of, or new approach to, disaster studies (Winchester, 1992; Shrubsole, 2000; Jones and Shrubsole, 2001; Pearce, 2001). While initially taking the form of assessments that still focused significantly on exposure-related variables, the notion of vulnerability has quickly expanded to include more social, economic, and political variables as explanatory for disaster. It has extended the notion of risk beyond the technical interpretations characterizing early studies. Similarly, the solutions to vulnerability now are seen to partially lie in improved understanding of the human system, which includes human values that govern our judgments and motivate our actions.

This chapter is divided into several sections. The first section introduces some of the key concepts and theoretical perspectives in the relevant hazard and disaster research to which this study will contribute. The meaning of the notion of vulnerability and its emergence are then explored in some detail. A discussion of the conceptual models of vulnerability is then presented with particular emphasis on one framework that is proposed for discussion and adaptation in this case study – Wisner et al.'s (2004) Pressure and Release (PAR) model. The issue of vulnerability reduction is presented through reflection on floodplain decision-

making, the meaning and goals of 'mitigation', and a specific discussion of nonstructural and structural approaches to vulnerability reduction. A brief review of the link between policy and vulnerability reduction is also done. Recent perspectives on the application of vulnerability concepts at a community level of analysis follows. Finally, there is a general discussion of culture and human values, followed by a more detailed review of values and their essential role in hazard related decision-making. A brief summary concludes the chapter.

2.2 Theoretical perspectives in hazards and disaster research

2.2.1 Research evolution: A broad overview

Historically, hazards research, and particularly flood research, was rooted in the geographical perspective, with additional major contributions from the social sciences (particularly disaster research in sociology). In the 1940's, geographer Gilbert White made a significant early contribution to flood research, by identifying and exploring the rise of flood losses even in the face of structural protections in floodplains. Although technology to reduce exposure to hazards had expanded significantly, human hardship from flood disasters was still on the rise. White (1973) drew attention to a new area of research termed 'human response' to natural hazards. This new perspective was the foundation for decades of behavioral, rather than physical, studies of hazard events – studies done primarily at the individual level of analysis. White (1973) was intrigued by failures to predict how people in a floodplain would behave in dealing with flood problems and a lack of understanding of why some groups of people respond differently than others. He, and others, then became critical of decision choice models that sought to only understand people's behavior based on economic optimization principles, or later through subjective utility models, because they did not explain behavior in flood studies. Simultaneously, researchers became increasingly interested in policy and anticipating people's responses to policy change. While policy studies were intended to aid decision-makers, success was limited.

Kates (1971), for example, attempted to apply a decision model (i.e., bounded rationality) to find out how people perceive hazards, the possible adjustments that they might make, and

what different factors might affect perceptions. He did work in floodplains in the Tennessee Valley in the 1960's that greatly expanded the notion of what might influence *what people do* when they are exposed to hazards. Two difficulties became apparent in the flood research: 1) the relationship, if any, between people's verbalized attitudes and actual behavior during a flood was tenuous and, 2) human occupancy in areas of high hazard persists even in the face of threat (White, 1973). These deficiencies prompted more research that identified a wider range of variables as contributing to risk perception and hazard adjustment than was at first perhaps anticipated. For example, further research on risk perception showed that an individual's expectations about the probability and severity of disaster impacts (i.e., risk perception), may be less important than the frequency of discussing, thinking about, and exchanging information about the risk (defined as 'hazard intrusiveness') in terms of predicting the adoption of mitigation and preparedness measures (Tierney et al., 2001).

Deficiencies in early studies have also led to the more multi-scale and multi-dimensional approaches that characterize more recent hazard studies (SEI, 2002). Increasingly, complexity in the linked human-natural system, and related decision-making processes, is being embraced. It has brought about a substantial redesign of both policy and practice in high risk areas, and new perspectives regarding decision-making. Most importantly, decisions and decision-making processes themselves are now viewed as potentially creating or reducing vulnerability. "Disaster is understood as the product of a cumulative set of decisions… (and) then the processes by which these choices are made become a focal point for potential change" (Comfort, Wisner, Cutter, Pulwarty, Hewitt, Oliver-Smith, Weiner, Fordham, Peacock and Krimgold, 1999, p. 41).

In fact, the improved approaches to hazard and disaster assessment that followed from the earliest studies on flood hazard generally recognized that our social systems influence the decisions of individuals and communities, and decisions are not simple and discrete summations of personal costs and benefits (real or perceived). By 1988, White elaborated on the importance of social processes in assessing risk in exposure to hazards by stating: "Unless a risk analysis comprehends the social structure within which individual decisions

are made, it may fall far short of understanding either the process or consequences of those decisions" (White, 1988, p.72).

White's initial work on human response, and subsequent research and critique of traditional event-focused hazard perspectives, paved the way for examining decision-making processes and social contexts as contributors to hazard vulnerability. Specific to flood hazards, he and other researchers (e.g., Kates, 1971; Hewitt, 1983; Quarantelli, 1988; Bogard, 1988) realized that understanding of flood disasters was limited by popular technocratic attitudes, measures, and interpretations. This acknowledgement made it possible to consider new approaches to flood damage reduction and mitigation that had not before been well recognized. Many of these were nonstructural approaches. Mitigation options were broadened to include more than just technocratically derived and implemented structural solutions to flood problems.

Kates' (1971) groundbreaking work, referred to commonly as the 'natural hazards paradigm' considered the issue of hazard in a linked human-ecological context, where the response of human groups to hazard was related to a number of key factors. He looked at techno-social patterns or stages of adjustment to natural hazard and what adjustments (i.e. choices made) tend to emerge from these stages and the resultant patterns of damage. His work has been characterized both as an early *human-ecological* or *political-ecological* perspective. His model of adjustment to hazard was based on seeing natural hazards as an interaction of man and nature "governed by the coexistent state of adjustment in the human use system and the state of nature in the natural events system" (Kates, 1971, p.78). Mutual impact (human and natural system) defined this perspective. He defined three broad categories of human adjustment to natural hazard threat: 1) those adjustments that modify the natural events system (e.g., structural measures such as those that provide barriers to limit the spread of flood waters), 2) those that modify the human use system (includes both structural and nonstructural measures, with emphasis on the latter) and, 3) a set of emergency adjustments (shorter-term adjustments typically to reduce hardship and losses post-event).

2.2.2 *Linking natural hazards and disaster perspectives*

The approaches of Kates and White (and others) discussed earlier are sometimes viewed as a 'natural hazards approach' and as separate from disaster approaches per say (Tierney et al., 2001) although the distinction is somewhat (and increasingly) hard to define. The key distinction is that the hazards approach focuses on how the adoption of hazard adjustments can reduce the undesirable results of a hazard event. Temporal focus in analysis is another primary difference. Geographers / planners look at understanding vulnerability, mitigation, and preparedness mainly pre-event, and look at a more limited number of hazards. Their focus is quite often at the individual scale, examining individual behavior. In contrast, disaster researchers, often sociologists, are interested in a broad range of disasters and seek to describe and analyze a variety of social units, often with a focus on organizational behavior. They look less at preparedness and more at conditions immediately prior to the event, response behaviors, and more immediate short-term consequences. They look only secondarily on actual recovery (Tierney et al., 2001). In addition, definitional problems related to the distinction between hazards and disaster research are compounded by the reality that disaster perspectives themselves are by no means well-defined conceptually (Tierney et al., 2001).

It is fair to say that various paradigms have been used in the field to conceptualize disasters. Many are still debated and usually reflect the discipline of the researcher. Disasters have been characterized as: sudden and dramatic events that involve social disruption or destabilization (Quarantelli, 1998a), that generate collective response (Quarantelli, 1998a), and that can in theory be mitigated (Tierney et al., 2001). Disasters have also been described as social constructions and thus products of social definition (Kreps, 1998a). They are characterized as causing some degree of destruction, as seen in the social science literature (Dynes, 1998; Quarantelli, 1998a), and in the political science literature (Platt, 1999) on disasters. Disasters have been defined in terms of psychosocial impact (Laska, 1990), and organizational and community impacts (Kreps and Bosworth, 1994; Dynes, 1998). They have also been defined according to evaluations that center on direct and indirect losses.

There are a number of overlapping hazards and disaster paradigms used by researchers. Key ones include: event-based paradigms or *functionalism* (where disasters are considered as discreet events which interfere with the functioning of society; also linked with a *systems* perspective); *political-economy* theories (focusing on how government can be contributors to disasters through promoting different activities – often for economic expediency) (Hewitt, 1997; Tierney et al., 2001); *political-ecological* perspectives (focusing on human population and patterns of production and resources allocation in the physical environment) (Oliver-Smith, 1999b). Tierney et al. (2001) also identify an 'emerging' *ecological-vulnerability* perspective that sees communities as consisting of loosely-coupled, heterogeneous ecological elements and networks in which power and resources are not distributed equally. Such inequities influence coping with disasters. This parallels the notion of the human-environment condition as a coupled system with its own endogenous sources of stress, namely where its own dynamics can be a source of threat (SEI, 2002). In this view it is possible to see a shift from the idea of one perturbation to which a society must cope or adapt to one where there are flows of stresses which emanate from both the human and natural environment. Inclusion of multiple stresses and multiple hazards as part of vulnerability assessment is also finding favor in the literature (Quarantelli, 1998b; Jones and Shrubsole, 2001; SEI, 2002).

As to the cause of natural disasters, there are two distinct types of conceptualizations in the literature. The first set of conceptualizations looks at event characteristics as independent variables, and social responses to the event as dependent variables; for example, floods of 'x' magnitude result in evacuation of 'y' persons. This was typical of the early event-focused approaches. Classical disaster research, like early hazards research, looked not at vulnerability but at 'the fact of disaster' (Alexander, 1997; Tierney et al., 2001).

Conversely, disaster studies that encompass vulnerability and mitigation approaches see social arrangements as determining the nature and extent of impact should a hazard event occur (Kreps, 1998a). In a conceptual shift, the vulnerability approaches see disasters as less a reaction to an event as they are a social consequence, and they are less a defense against

external attack, but rather partly a result of social organization and the ability of decision-making actors to face crisis (Quarantelli, 1998a).

Now there is an emphasis on examining, for instance, creation of vulnerability, distribution of vulnerability, and changes in vulnerability that occur at places where hazard events occur. There are more linkages between the physical science of hazards and the social science of disasters as it relates to natural events. This notion of vulnerability has also tended to move research in both hazards and disasters to focus less exclusively on the time period immediately surrounding an event, looking at causes and trends rooted in societal characteristics.

2.3 Vulnerability and vulnerability assessment

The increasing importance and reference to the concept of vulnerability, and its practical manifestation – namely, vulnerability assessment – reveals much about how attitudes towards disasters and decision-making have changed. Concern with exposure to a physical hazard risk has been supplemented with concern about social, economic, political and social processes that contribute to the impacts of an event. Vulnerability is now comprehensively defined to include not only physical dimensions of a hazard event, but also the social constructions of risk. The vulnerability approach (and others such as political-economy, social constructivist, political-ecological) emerged in response to the inability of traditional event-based assessments of hazards and disasters to really 'explain' disasters – where, and why, and to whom they occur. Many disciplines, then, have contributed and developed their own interpretations and perspectives on hazards that now expand the analysis of disasters to include social, political, economic, and cultural factors in human perception of, and response to, hazards.

Definitions of *vulnerability* in recent natural disaster research span several disciplines – geography, sociology, and anthropology. Examples include:

- ...characteristics of a person or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a hazard (Blaikie et al., 1994, p.9)

- ...the degree of susceptibility and resilience of the community and environment to hazards (Buckle, Mars, and Smale, 2000 in Jones and Shrubsole, 2001, p.16)

- ...vulnerability is the measure of the capacity to weather, resist, or recover from the impacts of a hazard in the long term as well as in the short term (Mileti, 1999, p. 106)

- ...vulnerability refers to the social and economic characteristics of a person, a household, or a group in terms of their capacity to cope with and to recover from the impacts of disaster (Zaman, 1999, p.194)

All four definitions contain two main concepts: the idea of threat and that adverse effect will vary as people respond to the threat. The definitions also allow for the existence of differential vulnerability based on social characteristics such as capacities to respond and resilience.

The definition by Blaikie et al. (1994), as noted in Chapter 1, will be adopted for this study. It is particularly suitable because it is not event specific, nor does it focus on the disaster agent characteristics. Rather, it allows for an examination of the capacities of social groups in relation to all four temporal parts of the hazard cycle (Tierney et al., 2001) – mitigation (which allows for anticipatory planning and measures to reduce exposure between events), preparedness (actions taken prior to disaster impact to enhance emergency response), response to the hazard event, and recovery.

The vulnerability approach looks at social issues in the pre-disaster stage as explanatory in terms of at least some of the outcomes from the hazard event. Key to the vulnerability approach is the assumption that there is an important relationship between everyday conditions within a community, and the totality of impact sustained once a trigger event (such as a natural disaster) occurs (Blaikie et al., 1994; Alexander, 1997).

In other words vulnerability is increasingly seen as a product of pre-existing conditions (power structure, poverty, ethnic diversity etc.) and / or processes (governance, decision-making, organizational capacities etc.) within a society. It is the combination of a triggering physical event and particular social factors that result in natural disasters – in other words, hazards confronting vulnerable communities cause disasters (Kovacs and Kunreuther, 2001).

Care should be taken to not automatically equate vulnerability with poverty – it is not always the case. Yodmani (2001) clarifies that social constructions of vulnerability can have various roots. While lack of access to resources and income opportunities are dimensions of vulnerability, and often consistent with poverty, 'other aspects of social positioning' can also determine people's vulnerability. He notes, for example, that vulnerability is influenced by factors such as age, ethnicity, gender, community structure, community decision-making processes and political issues. In the developed world context, where absolute poverty is often not as pressing, these latter three factors are of particular significance especially in terms of community level vulnerability assessment.

Another reason the vulnerability approach has found great acceptance in the last two decades is because it has been recognized that solely technocratic approaches are unable to 1) adequately address the complexity of disaster issues, and 2) the predisposition of certain communities to disaster. The technocratic approaches were the logical solutions to the hazard problems defined as external events to be controlled, but were obviously inadequate when social variables were seen as contributors to vulnerability.

Even the early vulnerability studies emphasized the biophysical assessments of vulnerability. Then, over time, the notion of physical agent became less dominant. A major shift in thinking about disasters accompanied this change. Most particularly, a disaster was no longer experienced as a reaction but rather as a social consequence (Gilbert, 1998a; Gilbert 1998b). Disaster was a result of the 'underlying logic' of the community (Gilbert, 1998a; Gilbert, 1998b). From this stance, the upsetting of human relations was central to the conceptual framework for vulnerability analysis.

Vulnerability can be altered by any change to the elements of the human or physical systems which are part of the context of a hazard event, and which also influence risk (Tobin and Montz, 1997). Blaikie et al. (1994) describe more specifically that risk of disaster is related to the chance that characteristics of a human group, as generated by political-economic conditions that make them unsafe, coincide in time and space with a trigger event to which they have been made vulnerable.

Vulnerability is a dynamic notion, and never a steady state phenomenon (Jones and Shrubsole, 2001; Pearce, 2001). It is sensitive to structural changes in society. It also changes over time and at different rates for some members of a community than for others. For example, vulnerability often increases at a greater rate for those who regularly have fewer resources at their disposal when there are successive hazard events. Vulnerability then can be increased through the cumulative effects of successive events or crises. Vulnerability reduction is a moving target, because conditions can vary dramatically from one point in time to another as pressures are increased or decreased by changing social and other circumstances at local, regional and global levels.

This issue of time-scale is a crucial one to understanding vulnerability. Lengthier time-scales in analysis appear generally missing in much of the natural hazards and disaster literature (Jones and Shrubsole, 2001; Tierney et al., 2001). Many hazard and disaster studies are limited to within months of the event; some cover a matter of years; few span a decade. It is difficult within short timeframes to map the nature of cultural and societal processes that impact, and in turn are impacted by, exposure to hazard. If one of the new thrusts is towards coupled ecological and social models, and developing vulnerability models that are evolutionary adaptive models (SEI, 2002), then broader time scales, and multi-scale models will be incorporated into future vulnerability analysis.

Vulnerability recently has been described as having both an internal and an external dimension (SEI, 2002). The internal dimension refers to insecurity and the capacity to anticipate, cope with, resist, and recover from the impact of a hazard. The external

dimension involves exposure to risks. In this conceptualization, the external side of vulnerability is defined by 'exposure' and the internal side by 'coping'.

In the flood context, it means that the nature of the flood (characteristics like duration, intensity etc.) and the social circumstances of impacted residents must both be considered in a comprehensive assessment of vulnerability; vulnerability then requires consideration of both social and bio-geophysical dimensions. A dilemma however is a lack of clear framework for showing linkages between spatial phenomena (like floods) and social structures and processes. Existing literature has little to say about the interactions between coupled social ecological systems (SEI, 2002). In other words, the processes within society that generate unsafe conditions and how they actually interact with a specific hazard to influence vulnerability rarely have been explored (Jones and Shrubsole, 2001).

2.3.1 Vulnerability assessment

Vulnerability assessment is a popular approach to dealing with vulnerability to natural hazard. The actual term 'vulnerability analysis' was first used in the 1970's and was seen as a tool in disaster management (Yodmani, 2001). The assessment attempts to understand *who* or *what* is vulnerable to hazards (Wates, 2000). In terms of natural hazards, because vulnerability is seen as a measure of a person or group's exposure to the hazard and degree to which they can recover, Blaikie et al. (1994) maintain that it is possible to develop a quantitative measure of vulnerability *only* in terms of the *probability* that a hazard of a particular intensity, frequency, and duration will occur. This probability in turn affects the degree of loss at the level of analysis considered (e.g., household or community) in relation to their level of vulnerability to specific hazards of different intensities.

This makes vulnerability then a hypothetical and predictive term that is proven only by observing the impact of the event should it occur (Blaikie et al., 1994). Thus understanding of vulnerability will evolve over time, must be based on post-event reflection, and intentional reduction in unsafe practices. History and experience are used to transform society towards a state of increased resilience to multiple shocks.

Models of vulnerability then serve primarily as methods for understanding the causes and symptoms of vulnerability. Vulnerability frameworks can serve various functions such as to help to identify vulnerable populations, predict what probable outcomes from an event may be, or even to identify possible implications of different policy alternatives. By way of example, a current guide by the National Oceanic and Atmospheric Administration (NOAA, 1999), for conducting an assessment of community vulnerability to hazard includes the following sections: hazard identification (comprehensive list of hazard types and prioritization); hazard analysis (map risk and rank susceptibility to hazard); critical facilities analysis (inventory and evaluation of facilities in relation to high-risk areas); societal analysis (identification of high need populations and develop strategies); economic analysis (identification of economic sectors and economic centers); environmental analysis (identification of key environmental resources and sensitive areas); mitigation opportunities analysis (assessment of participation in mitigation programs and inventory of high risk undeveloped land). This type of assessment is very suited to the developed world with a high reliance on technology and population studies. Other methods (mobility charting; wealth ranking; transect walks) have been successful and been found more appropriate in other contexts (NOAA, 1999), such as some developing nations where technology is not available, local experience with technology is limited, and local participatory methods of evaluating vulnerability are more meaningful in helping people to conceptualize vulnerability.

Vulnerability assessments have been applied to the more traditional approach to hazards through a focus on determining differential losses (Jones and Shrubsole, 2001; Tierney et al., 2001). For example, vulnerability assessments / analysis for many years focused most on vulnerable populations, their spatial distributions, infrastructure locations etc., for the purpose of generating viable response plans in a disaster. This is a temporally limited approach. Vulnerability assessed exclusively in this manner, with a focus on the disaster response and recovery phases of a disaster – such as flood – does not explain, for instance, why it is suggested that Canadians in the Red River Basin have not developed a disaster subculture, nor a culture of prevention, but rather a culture of dependency (Shrubsole, 2000). These types of considerations require a more thorough analysis of vulnerability as permitted in some frameworks (Winchester, 1992; Blaikie et al., 1994).

Human responses to hazard events have the potential to decrease or increase vulnerability. Yet, when it comes to an analysis of why certain responses occur out of the range of possible human responses to a hazard, there is a dearth of information available. The focus in research to date has been to establish criteria that show links between individual responses and various characteristics of the event. Why are some responses or options eliminated, especially over longer time-scales in a society? Root causes of vulnerability may offer explanation – including causes rooted in values, social capital, political ideology, type of economy, etc. A thorough understanding of vulnerability requires understanding of understated, little explored sources of vulnerability, and their impact on decision-making. Also improving understanding of some of these social and cultural characteristics (such as values and cultural beliefs) should improve assessment of vulnerability to multiple hazards because they have implications for *all* types of hazards. In fact, the general shift away from agent-specific approaches incorporates looking at general vulnerabilities (Pearce, 1997), as well as specific vulnerabilities, in disaster management.

The type of hazard being faced is important in assessing vulnerability. There are households or communities that are vulnerable to a wide range of hazards because of a broad inability to access a variety of resources and little choice options due to limited economic or political power (Winchester, 1992; Blaikie et al., 1994). Others are more vulnerable to some types of natural hazards than other types. Thus the indicators of vulnerability may be at times quite different in looking across different hazards as well as across different communities.

Sometimes models and frameworks of vulnerability assessment are produced primarily from the perspective of someone external to a community. This often does not do justice to the possible victims and players most directly affected. It is important to collect data reflecting 'indigenous interpretations of events and processes' which can perhaps enrich and alter frameworks. (Blaikie at al., 1994; Yodmani, 2001). This inclusion of local community members is being done explicitly in some types of vulnerability research, as it is in this case study. Within the context-based vulnerability concept, community perspectives are crucial to understanding and they should be solicited.

In general terms, vulnerability can be seen to expand the notion of risk, and thus is linked conceptually to risk. Unmanaged or mismanaged risks lead to disasters (Yodmani, 2001). Risk as a concept has a technical component that focuses narrowly on the *probability* of events and the *magnitude* of specific consequences (Denney, 2005). Technical conceptualizations of risk do not encapsulate aspects of risk related to perception of risk or other underlying concerns about risk characteristics that are omitted in the technical evaluations. These characteristics may include equity issues, various circumstances impacting generation of risk, or risk management issues – in other words additional issues that should play into the decision making process for risk reduction. They can be captured in vulnerability assessments. Adding the concept of vulnerability assessment to risk assessment can also help address contentious issues related to the relative roles of *technical expert* assessments of risk, and the *public* assessment of risk when decisions are made (Kasperson, Renn, Slovic, Brown, Emel, Goble, Kasperson, and Ratick, 1988).

Vulnerability assessment, with its dynamic characteristic, and 'process versus outcome' orientation in analysis, may also expose issues that perpetuate risk over time; risk assessments are by necessity more tied to the here and now, the realities of what exists and will be exposed at one location at one point in time. Vulnerability assessments should become an essential component of the evaluation of any major projects by decision-makers so that any impacts on vulnerability – related to any potential hazards at any point in the future – are recognized and taken into account.

Recently, vulnerability has been viewed as an essential part of an evolution in disaster management termed the 'disaster risk management 'approach (Yodmani, 2001). Yodmani (2001) defines this as a more comprehensive approach, inclusive of vulnerability analysis as but one part of disaster management. Three distinct but interrelated parts of disaster management include: *hazard assessment*, *vulnerability analysis*, and *enhancement of management capacity*. The most important characteristic of this approach is that the vulnerability assessment is seen as part of a decision-making and policy selection process. It is not done by experts and technicians in isolation from decision-makers and communities.

Ideally, the concept of 'management capacity' should explicitly include the importance of enhancing community level decision-making and community level management capacity – a notion captured in this research and in some of the community based research on disaster management (Pearce, 1997; PERI, 2001; Yodmani, 2001; Earth Summit 2002 Debate, 2002).

2.4 Conceptual models of vulnerability within hazard management

2.4.1 Introduction

There are many conceptual models of vulnerability that have been developed to examine the risk of various hazards to human populations. Finding the common ground among them can be a challenge. A few comments are in order on the general understanding of vulnerability; they are adapted in part from the Stockholm Environment Institute's report on Vulnerability and Global Environmental Change (SEI, 2002).

Conceptually there are often two dimensions to vulnerability; they are termed variously as: hazard / coping; external / internal dimensions. In summary the two dimensions encapsulate both the physical attributes of event / place / time and the social realm of potential and actual responses. Conceptually vulnerability is concerned with temporal perspectives – both history and future, and not the snapshot approach of classical event-oriented hazard studies. Linked with a longer time scale is the necessity of acknowledging as much as possible system complexity (joint human-natural) and dynamic processes – i.e., change over time. Vulnerability is also seen to involve multiple stresses (SEI, 2002). Differential vulnerability is typical (SEI, 2002); issues of equity in terms of whom is vulnerable and why are also common. Consideration of what resources (assets) are available to a household / community / nation often offer some explanation of differential vulnerability but what is considered an 'asset' must be assessed within the appropriate cultural context (Winchester, 1992; Yodmani, 2001) . The nature of livelihood activities is often a key to understanding vulnerability, especially through the link to access to resources (Winchester, 1992; Blaikie et al., 1994). Generic statements of vulnerability are not sufficient; rather it must be clearly stated 'to what' the human group is vulnerable (SEI, 2002).

Concerns with the concept of vulnerability, and the state of research, exist. While there has been detailed discussion of natural and societal characteristics that make people and places vulnerable, there is much less understanding of whether the measures that are used in assessment actually capture vulnerability, and what they might contribute to our understanding. The link between measures and the concept are unclear (Jones and Shrubsole, 2001; SEI, 2002). Vulnerability assessments also generally use the same measures as hazards assessments, looking for example, at damage, location, policy enforcement capacity, infrastructure (Jones and Shrubsole, 2001); an admitted weakness is that studies so far fail to link 'agent, measures and outcome' to an explanation of how a community becomes unsafe (Jones and Shrubsole, 2001).

Also, while there is acknowledgment of common conceptual components of vulnerability in models – namely, *stresses, sources of vulnerability*, and *impacts*, (alternatively called: *exposure*, *sensitivity*, and *coping capacity*) they are not specified similarly across studies. In other words it is not clear how much damage is 'significant'; how to specify 'capacity to be harmed' or 'exceeding coping capacity' (SEI, 2002). Furthermore, the relationship between components is not clearly understood. Adjustments and adaptations that are made to perturbations in the nature-human system are also only loosely accounted for in the literature (SEI, 2002).

Differential models of vulnerability are a common approach in the vulnerability literature because much of the literature on vulnerability has considered to a lesser or greater extent household level vulnerabilities (Winchester, 1992; Twigg and Bhatt, 1998; Zaman, 1999). These studies often determine what mix of factors tends to make some households more vulnerable than others to the same hazard. For example, Winchester's (1992) model focused on explaining vulnerability in terms of household characteristics that affect the economic well-being of the household over time as well as its position in society. Vulnerability was then viewed very broadly in terms of asset accumulation (meant in a broad sense, i.e., including social arrangements or assets as well as economic ones). His emphasis on household level arrangements contrasted to more traditional vulnerability approaches which

centered only on measures of physical and economic vulnerability (e.g., dwelling type; social class; occupation etc.). Winchester (1992) concluded that recovery (in the case of cyclones in his study) was dependent upon household characteristics as well as what was lost. He noted too that social vulnerability steadily increased with successive events and recovery capacities diminished. He recognized the inherent complexity in vulnerability analysis (Yodmani, 1992; Mileti, 1999)

Researchers realize that different households or different communities may be exposed to the same natural hazard event, and yet resist or recover from events very differently (Winchester, 1992; Zaman, 1999). By way of example, Zaman (1999) summarized five types of vulnerability - physical, economic, social, educational / informational and environmental - each of which has various components. To these he linked various indicators of vulnerability. For example, in explaining components of educational / informational vulnerability, he listed *forecasting*; *early warning and evacuation systems*, and; *training for emergency responses*. For indicators of this type of vulnerability he listed *lack of information*; *poor preparedness and evacuation*, and; *ineffective information diffusion*.

2.4.2 Pressure And Release (PAR) model: the progression of vulnerability

Wisner et al. (2004) and Blaikie et al. (1994) discuss the notion of differential vulnerability in a political ecology framework. Their 'progression of vulnerability' framework (PAR) has been widely cited for their focus on the 'non-natural' aspects of disaster, specifically the convergence of socially produced vulnerability and exposure (Tierney et al., 2001), which is depicted explicitly in their dynamic framework. They address the capacities of ordinary people to cope with disaster, and the need for comprehensive planning to reduce vulnerability that involves all stakeholders – with emphasis on grassroots mitigation actions (Tobin and Montz, 1997; Haque and Burton, 2005).

The authors of the model approach differential vulnerability, both at the household and community level, through a dynamic framework that they entitle the 'access model'. Like the work of Winchester (1992) they focus to some extent on assets. They frame their model in

the context of the following statement: "we can show how social systems create the conditions in which hazards have a differential impact on various societies and different groups within society" (Blaikie et al., 1994, p.46). In their focus on resources, unlike that of Winchester, nature itself becomes a part of the resources that are allocated by social processes.

Blaikie et al. (1994) define access to resources as the "ability of an individual, family, group, class or community to use resources which are directly required to secure a livelihood. Access to those resources is always based on social and economic relations" (p.48). They add that access is also usually based on the social relations of production, gender, ethnicity, status, and age. Put simply, these variables frequently affect access to resources. It is evident that rights and obligations to resources are not equally distributed among all people, resulting in less access for some; the reduced access leads to increased vulnerability in most situations.

Access to resources, then, is seen as a pivotal issue in differential vulnerability analysis. Degree of access during and post-crisis frequently is rooted in the access 'normally' available to an individual or household. Each person, in fact, has a different range of constraints and choices, often related to livelihood and social arrangements across many cultures, which influences access to resources.

The broad PAR disaster model, and political ecology perspective, (Figure 2.1) depicts both 1) the nature of the hazard, and 2) the vulnerability of the population that is exposed. It is referred to as the Pressure And Release Model (PAR). It depicts *disaster* at the intersection of two forces, where Risk = Hazard x Vulnerability (Wisner et al., 2004). At the intersection of the two opposing forces (i.e., pressures) is the disaster that unfolds when they collide in time and space. One of the two forces is the physical exposure to the hazard itself and the other consists of those processes that generate vulnerability.

Essentially, in the PAR model, root causes reflect the distribution of power in a society. Vulnerable people then have less secure livelihoods, less resources, and are often a low priority for government interventions to reduce risk. Dynamic pressures are those processes

and activities that 'translate' the effects of root causes into the vulnerability of unsafe conditions. They channel the root causes into *particular* forms of insecurity that need to be addressed.

The authors of the model assert that the relative contributions of the 1) geophysical or biological processes as opposed to 2) the social, economic and political processes vary from disaster to disaster. In addition, if one expands the *time* dimension in analysis it is possible to see how human actions and priorities (such as dam construction, deforestation, and development schemes) can alter or contribute to hazards over time. Similarly, social, economic, and political processes can result in segments of a human population being either more or less vulnerable, and this too can fluctuate over time.

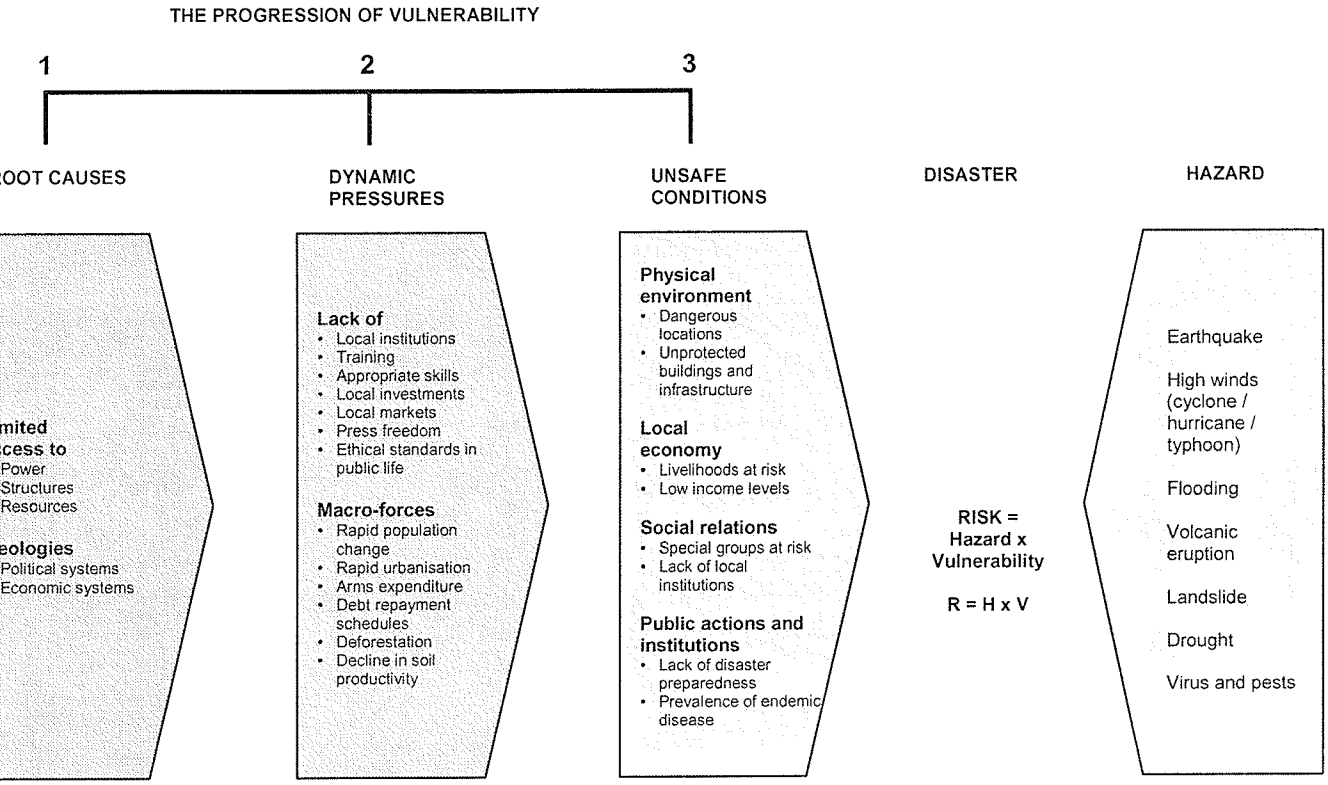

Figure 2.1 – PAR model (Wisner et al., 2004, p. 51 after Blaikie et al., 1994)
Pressures that result in disaster: the progression of vulnerability

The majority of the work done by Blaikie et al. (1994) was in the context of developing nations where the capacity to respond to a hazard is often more obviously linked to, for instance, absolute levels of poverty, lack of access to financial resources, political and economic (in)stability, and globalization. This is in contrast to developed world case studies where some of the sources of vulnerability may be rooted in other causes. For example, in developed nations, people (frequently wealthy) may elect to live in potentially hazardous environments (e.g., hillsides) for aesthetic reasons (e.g., the view); essentially wealthy people are faced with more choices (Etkin, 1999). This constitutes a type of voluntary vulnerability; these decisions are rational when one considers that those people in those regions have more financial resources, and social protections (e.g., insurance) to deal with a natural disaster (Rodrigue, 1993).

In the PAR model, economic, demographic and political processes are seen as the most important root causes of vulnerability. The authors do not, however, delve into how these processes may be manifest in a developed world scenario. They focus on these processes' influence on allocation and distribution of resources in the developing world. In contrast, this proposed work will seek to apply this model in the first world context, to explore what Blaikie et al. (1994) term the 'ideological order' of root causes, meaning those beliefs and worldviews that promote a certain set of responses to a hazard. Looking at vulnerability production, this research describes the values and beliefs about flood risk of both government institutions and communities, and how those beliefs and values result in decisions to use structural and nonstructural measures in flood protection. Often social values and beliefs result in certain expectations of both government institutions and private citizens, and dictate potential responses to any problem or threat. Values may act as constraints to coping and adaptation. In North America, for example, traditions of democracy, notions of private property, and the existence of the welfare state – all have implications for how people respond to hazards.

2.5 Vulnerability reduction: the use of structural and nonstructural measures

2.5.1 Floodplain management decision-making and vulnerability

It is possible to trace various models of decision-making in floodplain management intended to explain vulnerability to flood back over several decades. For many years private benefit / cost calculations were seen as the prime decision-making tool used by individuals choosing to live in a floodplain; namely, it was believed that people choose to live there because it is the economically *optimal choice* for them. This type of decision-making was based on an ideal – one where an individual decision-maker would have complete knowledge of the hazard, the types of consequences in choosing to live there, and that he / she would seek to make adjustments that would be an optimal resolution of the costs and benefits from each of the adjustments available to them (Blaikie et al., 1994).

From this unlikely idea of decision-making with *complete* knowledge came a modified model of decision-making called the subjective *expected utility* model that also focused on the desire to optimize – as did the earlier model – but it recognized that the decision-maker was unlikely to have complete knowledge. Thus the decision-maker's selected action would be based on their *view* of the likely effects of certain floodplain use. This determined their probable response to the problem. The weakness in both these models was that they did not ultimately explain much of the actual behavior observed in areas under study (White, 1973). Overall it was seen that behavior and responses to public policy options simply could not be predicted.

Next a model of decision-making termed the *bounded rationality* model was developed which focused on a more thorough examination of human behavior and its relation to the expressed perceptions of floodplain residents. What was key in this model was how people perceived hazards, how they perceived the range of adjustments available to them and what factors accounted for differences in their perceptions (White, 1973). The work that followed this new emphasis on perception by such researchers as Kates (1971) and White (1973) set a new and important course in analysis of decision-making as it relates to living with a hazard.

The new emphasis was on 1) the perceptions of the individual decision-maker and 2) the relationship between perceptions, verbalized expressions of attitudes towards the hazard, and behavior. Related to perception and choice of adjustments were such factors as personality, information, experience, and the role of the decision-maker in the decision situation.

Ultimately this and other new models of decision-making, combined with evolving knowledge about risk and uncertainty, resulted in a change in approach to hazard research and management. The number of variables influencing the use and management of floodplains became dramatically expanded. Interdisciplinary teams began to work together on understanding human behavior, and application of this knowledge to policy creation. 'Vulnerability' as a notion emerged simultaneously, and vulnerability assessment came to fruition in the hazard context.

At a practical level, the more comprehensive approach to decision-making led to a significant change in the United States in how the Army Corp of Engineers – the leaders in North American flood management strategies – and others, began to handle flood threat. Simply devising and implementing structural measures, based on the assessments of engineers and authorities, was no longer sufficient to reducing losses from flooding. Analysis of flood risk became more comprehensive. More information was gathered, flood-mapping increased, and ways of information dissemination improved in hopes of influencing both individuals and public agencies to alter their decision-making in directions that would reduce vulnerability. The most key changes were calls to action 1) about improving basic knowledge about flood hazard, 2) to come up with criteria for regulation and treatment of floodplains particularly as it related to new developments (a nonstructural approach), and 3) the need to provide technical services to managers of floodplain property. In the U.S. there was also the development of a national program for flood insurance, although this was not the case in Canada.

The movement towards a more comprehensive approach in understanding and influencing floodplain management decision-making has also led to more specification of policies available for mitigating the risk of such environmental extremes (Mileti, 1980). It clearly opened the door to more nonstructural approaches with their philosophical roots in

influencing the social rather than physical system (Pal, 2002). There has been more work on explaining social organizational mechanisms that influence how both groups and individuals adopt and implement policies to mitigate risk into an unknown future. It has been learned that various characteristics of social units contribute significantly to the type and degree of risk-mitigating adjustments that are adopted (Thompson et al., 1990; Denney, 2005). Social and cultural contexts have been seen as important in vulnerability reduction and preventing disaster impacts.

2.5.2 Mitigation

In floodplain decision-making, the overriding goal in assessing vulnerability is to be able to take action to reduce or eliminate it. This frequently takes the form of 'mitigation'. In the natural hazards community, the general use of the term 'mitigation' is defined as "the wide array of actions that can be taken to reduce vulnerability" (Haque and Burton, 2005, p.341). This broad definition suggests a meaning for the term which goes beyond the notions of preparedness and response so often referred to in the disaster management literature. It implies "sustained deliberative measures, implemented well in advance of impending disaster" (Haque and Burton, 2005, p.342). This is consistent with the notion of anticipatory thinking about vulnerability endorsed by Blaikie et al. (1994) which directs society to act well in advance of the threat, and counters complacency.

In a hazard-specific context such as flooding, *mitigation* typically consists of structural and nonstructural measures which are designed to reduce exposure and thus reduce risk (Tobin and Montz, 1997), and by extension losses and other impacts – such as stress. Blaikie et al. (1994) claim that it is essential to recognize that mitigation is not just about making changes to the hazard side of the vulnerability model but requires attention to the context of vulnerability and how it has evolved in the society. This notion is echoed, and expanded upon, in Tobin and Montz' (1997) hazard model in which they claim that loss reduction can only completely occur through structural change within society, changes which alter perceptions and behavior to limit people living in hazardous areas for short-term benefit – while society incurs significant long run losses due to poor decision-making in the hazard zone (Tobin and Montz, 1997).

Tobin and Montz (1997) challenge the classic model of hazard management where only through mitigation are losses reduced. They promote a model that would incorporate planning aimed at identifying and bringing about structural changes, including changed perceptions of hazards and mitigation. They depict the importance of structural changes to society in influencing mitigation actions, through perceptual shifts, and the potential for the reverse. They also highlight the potential role of a comprehensive planning approach in influencing both structural changes in society and selection of mitigation measures. These variables, in turn, influence losses and non-tangible negative impacts of natural hazard events. This type of perspective is one where mitigation does not consist simply of a project to be implemented, but rather is inclusive of broader goals and plans for the human-natural system, and is characterized by complexity, and involvement of a variety of stakeholders. It also must vary over time as new realities and new challenges to vulnerability emerge (such as climate change).

Unlike early, popular hazard management models that focused on the use of mitigation strategies only in exposure and risk reduction, current vulnerability approaches assume that structural changes to society are essential in creating resilience in communities. Structural changes require a change in the accepted norms of society because, in fact, it is the social / political organizations, beliefs, and attitudes of members of society – as reflected in decision-making – that have ultimately contributed to the vulnerability in that place at that time. This is the essence of vulnerability theory per Tobin and Montz (1997). For this reason Tobin and Montz (1997) focus less on the role of individual action in reducing losses and reducing vulnerability over the long run. They place responsibility instead with hazard managers, planners, and government leaders to move society in new directions in use of hazard-prone areas. They promote the idea of leadership as essential to vulnerability reduction.

Tobin and Montz (1997) also suggest that it is an important role of politicians and managers to minimize vulnerability by ultimately helping to change perceptions of a hazard – perceptions at both administrative levels and among the public. Changing perceptions are important to making people aware of the risk in some locations and prompting them to

consequently change their behavior. This type of change does not occur with mitigation projects alone. Rather, decision-makers must make a concerted effort to focus attention on vulnerability reduction in the broadest sense, actually influencing perceptions, attempting to alter misperceptions when they exist, and not falling into the trap of quick post-disaster mitigation projects that merely duplicate the mistakes of the past with a quick return to the status quo. Often quick mitigation fixes are politically expedient but fail to reduce vulnerability. Short-sighted mitigation measures frequently lead to higher risk because of over-reliance on measures that have technological limits (Hewitt, 1997; Etkin, 1999); when technology then fails there may be a worse catastrophe than the natural events would cause normally (e.g., levee breaks in New Orleans during Hurricane Katrina). Short-sighted measures also often encourage excessive development in hazardous areas because a false perception of security (referred to as the 'levee effect') is created. Ideally, mitigation planning should incorporate a measure of *anticipation*, as communities and societies must develop a capacity to recognize and incorporate existing risks (of many types) in routine decision-making (Blaikie et al., 1994).

Bogard (1988) claims that mitigation is often misrepresented as an effect (of one hazard event) rather than as a potential producer of future effects. He argues that emphasizing the term adjustment to hazard compromises the idea of an active role for mitigation in altering the potential for harm from future disaster. He states that the narrow term 'adjustment' still keeps the primary focus of research on the nature of the trigger event itself. This notion of 'adjustment' can be contrasted perhaps with the increasingly popular idea of 'adaptation' which has a much broader meaning in that it addresses the interconnectedness of linked social-ecological systems, and a need to create resilience within systems over time.

Bogard (1988) believes that there have been numerous incidents presented in the literature where mitigation actions – particularly the more limited notion of 'adjustments' – have in fact increased vulnerability – especially in the long term, given limited knowledge and a high level of uncertainty. He sees that mitigation decisions are frequently made through application of rational choice theory – which cannot operate efficiently in such an uncertain and complex environment. Benefit-cost calculations are limited in their ability to represent

the complex systems under scrutiny when mitigation decisions are made. Consequences of mitigation actions are then poorly understood and largely ignored.

Tobin and Montz (1997) also suggest ways for communities and decision-makers to manage reduction in vulnerability to natural hazards. They adapted these principles from Blaikie et al. (1994). They particularly iterate a key role for policy and policy makers. For instance: selection of mitigation practices, balancing who is to be protected versus those who may not, assessing a wide range of potential mitigation project impacts (economic, political, legal, administrative, environmental, etc.), redistribution of resources needed for hazard reduction, enforcement of policies designed to reduce vulnerability over the long-term even in the face of short term interests, influencing perception of risk through awareness, supporting research to provide a base for development and mitigation projects – these activities fall in large part to policy-makers, typically government representatives / agencies.

Throughout the literature there is a call for use of a combination of both vulnerability assessment and suitable mitigation strategies as part of standard and proactive planning for hazards (Blaikie et al., 1994; Tobin and Montz, 1997; Yodmani, 2001). Comprehensive disaster risk management, which is inclusive of a detailed vulnerability assessment, is today consistent with a paradigm shift in the mainstream development practice that is now characterized by concern with good governance, accountability, and acknowledgement of the need for bottom-up approaches (Yodmani, 2001).

One challenge to promoting the importance of mitigation is when no threatening incident has occurred in recent memory. Blaikie et al. (1994) discuss the importance of provision of an institutional memory of disasters that links with new generations of bureaucrats and managers / planners, and also with the collective memory of the people (as through popular culture or practices). This can encourage mitigation, keeping the focus on anticipation of a hazard event and the need for creation and implementation of mitigation strategies. While clearly advantageous to keeping mitigation issues at the forefront of social consciousness, the success of appeal to collective 'memory' is also influenced by for instance, mobility of the

population, or weak social networks – exactly the type of variables that a vulnerability assessment should reveal.

Ultimately, the role of mitigation is to reduce or eliminate risk, and with it, vulnerability. While sometimes eliminated, risk more typically is reduced, or transferred – for instance to another group (e.g., insurance company) or it may be assumed (as when government provides compensation to homeowners after a flood event). In the case of flood, it is usually not possible to eliminate risk completely through modifying physical processes; mitigation efforts are focused on reducing risk to an acceptable level (Tobin and Montz, 1997).

Examining further the issue of risk transference, there is also a temporal aspect to risk transference as risks may be transferred to the future; risk transference then becomes an "important contributor to the buildup of future loss potential." (Etkin, 1999, p.73). Etkin (1999) illustrates that measures taken by a society to address a current risk may result in long-term vulnerability increases. This occurs because the mitigation measure taken may, in fact, trigger more activity in a hazardous zone because it is perceived that such activities are appropriate given the protections in place; people act in 'riskier ways' as a result of the mitigation. But should structural mitigation measures fail, damages are substantially higher as a result of the change in behavior that has occurred. It becomes evident in that scenario that long term vulnerability has increased when risk was transferred from the more frequent, low-impact event to a rarer high-impact event (Etkin, 1999). This is compounded by people's limited ability to perceive risks that are rare in their experience [i.e., the high-impact rare event] (Etkin, 1999).

Development (a common activity in hazardous zones due to its relationship to the pursuit of profit) can often then increase vulnerability and merely postpone losses into the future (Mileti, 1999; Etkin, 1999). There is evidently a need to address risk transference in mitigating damages. A very hopeful note in the Canadian context has been one of the key recommendations to flow from consultations on the development of a National Disaster Mitigation Strategy; namely, the recommendation states that communities should ensure that

local risk reduction measures do not transfer risk to other areas or increase risk from other hazards (Hwacha, 2005).

2.5.3 Comparing structural and nonstructural mitigation approaches

In the floodplain management context mitigation is used to describe a wide variety of approaches available to communities to take action to reduce flood damages (Pal, 2002). Two general categories of approaches are referred to as *structural* and *nonstructural*. The former consists of many measures that fall predominantly under what Kates (1971), many years ago, referred to as measures to modify the natural events system. Engineering works and activities fall under the former category including construction of dams, floodways, dykes, levees or reservoirs etc. These rely heavily on the analysis and decisions of experts, probabilistic and quantitative assessments, and 'expert' recommendations to decision-makers based on the values and orientation of their respective disciplines.

It has also become increasingly evident that structural (primarily engineering) mitigation measures can "only deal with the aspects of physical vulnerability of people, property, and assets and thus are inadequate to encompass the full spectrum of disaster management" (Haque and Burton, 2005, p. 345). Viewing vulnerability from a social context, in contrast, forces communities to assess capacities and weaknesses; in fact, according to Haque and Burton (2005) recent work in Australia has strongly suggested that mitigation efforts should be built on strengths and target weaknesses and limitations. This demands perhaps a perceptual shift where mitigation is not viewed as an application of a singular solution to a technologically bounded problem – such as a floodway that protects to the 1/700 year flood level – but rather as one item within a 'toolbox' of options that addresses only one aspect of flood hazard (i.e., water movement).

Some of the greatest perils in an exclusively structural approach are perhaps related to the assumptions that follow from their implementation – particularly assumptions by the public about, for instance: 1) levels of safety; 2) the appropriateness of further development in the floodplain in question; and, 3) who is accountable in the event of structural failures. A failing of structural measures, typically and historically, has been a lack of public

involvement in any significant or highly influential way, making it possible to ignore the social aspects of mitigation.

Structural mitigation measures are more likely to promote a paternalistic and dependent attitude towards risk rather than self-reliance, to minimize the need for education of the various publics by emphasizing the role of the 'expert', to fail to take advantage of local knowledge and social networks, to limit understanding of river systems and particularly the impact of the built environment, to transpose risk to another time and space rather than having local entities assume responsibility for the risk and for their development decisions, and to thwart needed dialogue on how social and economic values can co-exist (adapted from Cutter, 2000). These characteristics thwart the ability for individuals and communities to bear primary responsibility for their own hazard mitigation as essential knowledge, awareness, preparation and appropriate response-behaviors (Haque and Burton, 2005) are compromised.

In contrast, nonstructural measures focus on modifications to the social system – similar to Kates' (1971) modifications of the human use system, although a broader application of the idea of 'human use' than perhaps he intended. The measures themselves include land-use planning, building codes, insurance, emergency response (including community response plans), warning systems, information gathering and dissemination etc. Pal (2002) notes that structural and nonstructural approaches actually have two very different philosophical bases. Nonstructural approaches tend to be more comprehensive and integrative. While proponents of a structural measure will often present it as 'the solution', nonstructural measures are more apt to be seen as part of a package of measures designed to fill in gaps in knowledge or omissions in planning, and respond as necessary to changes in knowledge, perception, etc. This is consistent with Pal (2002), Mileti (1999), and Hewitt (1997) who see that non-structural approaches seek to identify the parts of a social system relevant to reducing hazard potential and impact potential – including behaviors and perceptions. It would seem that nonstructural measures also can also more easily expand the range of resources and options available for implementing adjustments in human practices (which should in theory expand adaptive capacity); in contrast adaptive capacity may be thwarted by reliance on structural measures. Nonstructural measures, and their success, often are linked to dialogue on

balancing community and societal priorities, education of citizens, communication through informal as well as formal channels, and a deeper understanding of the experiences and needs of disaster victims beyond their measurable losses. An adaptive combination of both structural and nonstructural measures, capable of responding to changes in both the natural and human systems might be the ideal through forcing a view that the two systems are inextricably intertwined. Historically many hazards have been mitigated though use of constructed structural measures; recently more emphasis has been on non-structural measures to reduce losses as damages from natural disasters have continued to increase.

In Canada, it has been recognized that a heavy emphasis on structural mitigation measures has failed to adequately reduce damages and negative social impacts from flooding (Shrubsole, 2000). There is concern that achieved reductions are only temporary, meaning that communities are not sufficiently resilient to potential future floods – particularly if the floods are of higher magnitude or exhibit unanticipated characteristics (Shrubsole, 2000). As a result there has been an increase in use of nonstructural measures, primarily as a supplement to structural measures in Canada (Pal, 2002). Nonstructural flood mitigation measures widen the options for adjustments to flood risk. They can include a wide variety of strategies to restrict or govern land uses, encourage better construction and building codes, protect individual properties, improve warning systems and emergency response plans, or measures such as insurance which allow for explicit recognition of risk and enhanced compensation options.

Nonstructural measures are particularly useful because they acknowledge that "making mitigation a reality will require overcoming many human behaviors along with financial, political and social obstacles" (Mileti, 1999, p. 136). Mileti (1999) identifies these factors as 'constraints to adjustments' (p. 136) a term that has relevance when cultural factors such as worldview and values are considered for their contribution to community vulnerability. Many of these strategies are markedly different from structural approaches in that they often encourage or require the cooperation of communities or individuals. They assume that individuals and communities are to be actively involved in risk reduction, rather than dependent upon the actions of government agencies. One suggested reason for less emphasis

on non-structural measures is that it is more difficult to determine their effectiveness – particularly in traditional highly quantitative benefit-cost terms (Montz and Tobin, 1997). They are also considered to be too expensive (Natural Hazards Research and Applications Workshop, 1997).

It may also be that non-structural measures require more knowledge and understanding on the part of the public, a proactive education component, a more cooperative planning approach (ideally with a high level of public participation), and a temporal focus that is longer. These factors have not been emphasized in most past decision-making processes.

When numerous non-structural measures are instituted and actively supported by government and communities, they reinforce the reality that residents live in a floodplain and that their personal decision-making must be done in that context. Contrast this to a large structure such as a dam or floodway that is only periodically activated during hazard events; operation is usually instituted and controlled by experts rather than local residents. Large construction projects then serve as more infrequent reminders of vulnerability. They can delay adjustments and longer-term adaptations to the flood threat. Admittedly, so might nonstructural measures, but to a lesser degree.

While the need for, and purpose of, mitigation is fairly obvious – namely to lessen community vulnerability to hazard – what is less obvious is the wide variety of interdependent factors that can contribute to vulnerability and thus become potential targets for intervention (i.e., targets for 'mitigation'). These coincide with Blaikie et al.'s (1994) root causes of vulnerability. Dennis Mileti (1999) argues for creativity in identifying and addressing some of the root causes of disaster, causes which may be as diverse as erosion of social capital, ecological destruction, high housing density, unregulated economic growth etc.

Floods, like many natural disasters, have an increased impact because of development processes. Floodplains are historically one of the landscapes most in demand by humans for a variety of practical as well as aesthetic reasons. Hence, population growth and associated development is often highly concentrated along the banks of a river, the area at highest risk should the river overflow its banks. It is possible that development is oriented to different

values than vulnerability reduction (Natural Hazards Research and Applications Workshop, 1997). Development patterns and associated policies then are highly implicated in a search for socially derived sources of vulnerability in Canada and elsewhere. And as a source, they are a suitable target for vulnerability reduction.

A link between new thinking about vulnerability and a need to consider broader options for floodplain management can be made. The new focus in vulnerability analysis came about because traditional approaches to hazard risk reduction, aimed at limiting exposure, were insufficient to handle the complexity of the system and sufficiently reduce vulnerability. It has also become abundantly clear in recent decades that some individuals, some groups, and some communities are more at risk to flood now than they were before structural and non-structural measures were introduced. Clues to this may lie in the 1) social, economic, and political constructions of vulnerability in the society (i.e., those social, economic and political variables that define a society's vulnerability), and 2) the role that structural and non-structural measures have played in influencing perceptions of risk. It is possible that mitigation measures are not encouraging necessary changes in how we think and use floodplains, and problems in how we use floodplains are increasing as a result.

2.5.4 Policy as a strategy for vulnerability reduction

Vulnerability and policy are closely linked, because policy should serve as a mechanism for taking into account and protecting the public interest. In fact, the protection of the public good is a primary function of government. Haque and Burton (2005), in commenting on the democratic political system, noted that there are current institutional norms and practices in vulnerability reduction that have been criticized as 'superficial' and 'inefficient'. One area of criticism relates to pressures that constrain public involvement processes in hazard and disaster management due in part to the complexity of the issues, problems accessing financial and technical resources, and a lack of accountability of elected public representatives. Yet decision-makers, whether at the local, provincial or municipal level have an obligation to address vulnerability and gather and interpret information relevant to vulnerability assessment and mitigation options. Their role also includes representing collective values of

the public in mitigation decisions, and guiding a coherent agenda for change when necessary. These are difficult with weak public participation processes.

It is possible to view the notion of 'disaster' as "an evolving policy process" (Comfort et al., 1999, p.41). This view includes the perspective that disaster is a product of a cumulative set of decisions over time, and the processes by which decisions are made are a focal point for potential change (Comfort et al., 1999). Multiple decisions in multiple arenas (social, political, economic, environmental etc.) and at different scales (local, national, global) all mutually impact each other and overall vulnerability. Critical decision points and policy opportunities can avert or enhance the likelihood of disaster and need to be identified and carefully considered in a vulnerability context. Policy and practice are then, in essence, seen as mechanisms for disaster reduction. Careful analysis of policy alternatives then holds potential to prevent the recurrence of, for example, faulty development policy that has been culpable in recent disaster losses, or disaster relief policies that have eroded local capacities post-disaster thus increasing vulnerability.

Suggestions of how to enhance a policy approach to reduce vulnerability include: an interdisciplinary assessment of local vulnerabilities to a wide variety of hazards, enhancement of community capacity to coordinate appropriate and timely actions through multi-directional information flows, facilitation of informed action at the local level with necessary resource inputs and support, and mapping of the decision processes for mitigation preparedness, response and recovery – which is inclusive of all actors and their assumptions about risk (adapted from Comfort et al., 1999). These, and most notably the latter recommendation, offer a means of scrutinizing the role of policy creation and implementation in contributing to vulnerability, identifying weaknesses in current decision-making practices, and exposing some of the assumptions that constrain decision-makers' ability to reduce vulnerability.

Policymakers also face considerable pressure and influence from a number of concerned groups, ranging from senior government, other government departments, non-government organizations, special interest groups, and the local communities who need a vulnerability -

reduction strategy. During an event, natural disasters almost always become the target of large-scale governmental activity and often involve formal legislated responses (Schneider, 1995). Disasters quickly become part of a policy agenda building process, and are 'triggering mechanisms' – meaning that they constitute problems that are rapidly catapulted into important policy issues and hit the government agenda instantaneously (Schneider, 1995).

Natural disasters also create problems that can sometimes only realistically be addressed and managed by government; policies and procedures to address disaster typically constitute 'public goods' meaning that people are reluctant to pay for these services through the public sector. So responsibility often lies particularly with government.

Responses to hazards, including policy responses, are not consistent. However, there are certain facts that tend to increase the degree of response. One factor is scale. In the U.S. for instance, most flood-related policy and legislation have followed directly from devastating events (Tobin and Montz, 1997). Part of this was almost certainly a response to widely escalating disaster recovery costs, public pressure in the aftermath of the event, and the not illogical assumption by the public and leadership alike that past practice must be flawed. In considering flood disasters in Canada and the United States, policies have shifted in recent years from exclusively control and technological fixes to such nonstructural measures as regulatory mechanisms for development and watershed management. Policy has also tended to change toward less emphasis on disaster relief and more on prevention and mitigation. Overall, both the scale and significance of losses have brought vulnerability to the public agenda.

In general the goal of any hazard-related policy is to reduce exposure and vulnerability (Tobin and Montz, 1997). Achieving this goal however is very complex. Policies to reduce vulnerability may be directed toward any part of the hazards complex, meaning from preventive policies that focus on planning and mitigation, to relief policies to lessen the economic impact on victims. Thus the options are numerous in terms of how to reduce vulnerability. Decisions to select certain options over others are linked with the nature,

values, and operations of the political system in combination with the actual characteristics of the hazard itself. Because, however, vulnerability is influenced by a range of variables [see Blaikie et al.'s (1994) PAR model for example], it is then altered by any change in any one variable. This supports claims by Winchester (1992) and others that vulnerability is a dynamic concept. If, at a policy or any level, we seek to alter vulnerability there are theoretically then a number of possible approaches to intervention.

Different groups within society, or even different levels of government, may also have different ideas on what policy is desirable to reduce vulnerability. Similarly, policies, once selected, may be implemented in various ways in various combinations. The most common options for implementing hazard policy to reduce vulnerability include 1) regulatory mechanisms 2) programmatic initiatives 3) planning, and 4) financial packages (Tobin and Montz, 1997).

An important issue in hazard policy is to define what specific goals will contribute to the overall reduction of vulnerability (Tobin and Montz, 1997). In policy development it is essential to see and address the 'big picture' as well as local needs and values. Many sectors are affected by single natural hazards and may need appropriate policy to move them in directions to reduce vulnerability (e.g., housing, agriculture, transportation, public health). Jones and Shrubsole (2001) refer to multiple vulnerabilities contributing to overall vulnerability to hazard.

When government (whether local or provincial or national) does select among potential mitigation options there may be many reasons for the choices made. Influencing mitigation decisions are such variables as cost, the degree of liability that various levels of government might have, the information (type and amount) presented to decision-makers on various options (cost-benefit? social impact assessment?), and the pressure from interest groups. A key variable that was previously minimized in decision-making was the issue of uncertainty in engineering calculations, in estimations of naturally occurring random events (e.g., precipitation), in prediction of economic trends (adapted from Mileti, 1999), and uncertainty

in predicting human response to disaster. New methods to deal with the first three are seen by Mileti (1999) to be rightfully bringing uncertainty to the realm of decision-makers.

It has been suggested that mitigation policy and practice be directed toward specific sectors of society so that the maximum number of people can be protected (Blaikie et al., 1994). It has also been suggested that mitigation become more 'active' (consistent with Bogard, 1988) with movement away from large-scale structural controls passively controlled by government, to small nonstructural measures more under local control (Tobin and Montz, 1997). This is because local governments are considered to be more aware of local issues as well as having a vested interest in effective planning. Adopting a planning perspective that encourages local planning and participation is increasingly seen as the means to more effective planning and reduction of local vulnerability.

Studies on social responses to flood risk and other hazards further reveal that simply having a risk-mitigating policy may not in fact reduce risk if the policy is not well implemented (Mileti, 1980). Policy can be 'on the books' but poorly understood, infrequently referenced, or poorly implemented. Appropriate policy creation and implementation are then key to risk reduction and simultaneously to vulnerability reduction.

While some changes have occurred in policy response to flood vulnerability there are clearly many challenges that remain in improving decision-making in our floodplains. Recent floods still reveal that decision-makers continue to display the same old attitudes and decision-making practices that have been criticized in the literature (Tobin and Montz, 1997).

2.6 Applying vulnerability concepts to communities at risk

People want their communities to be sustainable over time. The term 'sustainability' when applied to communities, and particularly to communities with exposure to extreme events, means that the community can tolerate and essentially overcome disaster impacts such as damage, diminished productivity, and reduced quality of life without significant outside assistance (Mileti, 1999). In a sustainable community, any diminishment in community

resources and capacities would be overcome in a relatively short amount of time, and the community may find itself in fact more disaster-resistant as a result of learning and appropriate adaptations to recognized weaknesses that the disaster revealed. Sustainability then, and vulnerability reduction, are processes and not outcomes per say, and require linked natural-social systems to adapt to changes. Change characterizes both natural and human systems – being inevitable and ongoing. Humans try to cope with changes through a series of both short-term and longer term actions and adjustments.

The use of the term *adjustment* to hazard is common in the hazards literature. In that context, 'adjustment' is based on the idea that extremes in physical systems become disasters when the social systems have not taken the extremes sufficiently into account when adjusting to the physical world (Mileti, 1980). It is hazards literature rather than disaster literature that particularly is concerned with seeking explanations for adjustment to the risk of future disaster prevalent in everyday life. Hazard research has been devoted in part to specifying policies available for mitigating the risk of future hazards. Such adjustments frequently take the form of what is typically termed 'mitigation' measures. Mitigation perhaps differs from the concept of 'adjustment' in that mitigation implies 'deliberateness' of action to reduce impact rather than the unconscious adjustments that characterize some societies. Mitigation then is a subset of possible adjustments designed to reduce vulnerability, ideally over the longer term.

Communities undertake mitigation activities to reduce the likelihood of future harm. Yet, negative consequences of mitigation can exist and cannot always be fully anticipated (Bogard, 1988). Such consequences include: 1) increased vulnerability to a threat, 2) increased hazardness of a certain location, or 3) shifted costs for mitigation to particular social groups or classes (Bogard, 1988). Bogard criticized community mitigation efforts by saying that little effort has been expended in systematically examining or trying to theorize about the potential negative consequences of mitigation. Emphasis is usually on the benefits almost exclusively. He claimed it is possible for even negative consequences of mitigation to be applied appropriately to reduce future vulnerability - including at a community level (Bogard, 1988). Uncertainties change with each mitigation effort and its effects; as a result,

negative feedback alters and improves the knowledge of the decision-maker. Lack of critique then of mitigation efforts is a critical flaw in a process of reducing vulnerability. Feedback can allow for learning from mistakes, iteratively, if an adaptive learning approach is adopted.

Technological improvements and advancements in mitigation strategies do not necessarily mean that the benefits of such improvements will be felt equitably across a region or nation, or part of the globe. The reason for this, in social vulnerability terms, is the disparity in power and resources between groups. There can be great differences in access to mitigation resources between two countries, and often within a single jurisdiction there are polarizations between the rich and poor, or the powerful and powerless. Recent discussions in Manitoba about the proposed expansion of the Winnipeg floodway and potential negative impacts on rural communities raises the specter of such polarizations, given the economic and political importance of the City of Winnipeg. This issue of 'equity' in mitigation selection is important. Jones and Shrubsole (2001) note that equity is one criteria for evaluating vulnerability, potentially operationalized through, for example "biases in the orientation, operation, investment and application of mitigation projects"; or "locus of control"– meaning degree of control among stakeholders involved in development and mitigation decision-making" (Jones and Shrubsole, 2001, p.63).

In early studies technological fixes to the problem of hazard or technocratic approaches to reducing damages and vulnerability were seen to often undermine community processes for problem-solving. These structural interventions frequently undermined what has been referred to as culturally informed adaptive practices (Zaman, 1999). These adaptive practices are socially derived and socially relevant practices that relieve vulnerability. In work done with Emdad Haque in Bangladesh, they found a majority of community members to have taken corrective measures (i.e., adjustments) to minimize flood losses. They also concluded membership in social and institutional networks can effectively minimize hazard impacts, and by extension, relieve vulnerability. Obviously corrective measures and available resources can exist in various forms (e.g., social versus financial) in different cultures, and understanding of cultural and community context is important to understanding in what

forms vulnerability may be found. This reinforces the notion of vulnerability as being highly context based.

Oliver-Smith (1999b) also suggests that more attention should perhaps be devoted, at a community level of analysis, to finding culturally appropriate ways to use the capacities that are seen in post-disaster solidarity. Vulnerability reduction through nurturing of community capacities and creation of more resilient communities, rather than on creating dependencies on foreign aid or government assistance, is highly advantageous. Oliver-Smith (1999b) warns that a challenge perhaps in planning for a disaster is to distinguish between communities that can confront challenge and those that will be further eroded without heavy reliance on external resources.

In areas such as Canada where institutionalized distributional mechanisms via government are the major response system to crisis, opportunities to build community solidarity are often missed entirely, and community capacities go unrealized. Opportunities then for communities to adapt to local hazards are lost. It would seem that the government role in disaster management in Canada, characterized by the dominance of provincial and federal authorities, has not readily reflected the prevalent view emerging out of the 1990's hazard and disaster literature; namely, that natural disasters should be viewed as community-based problems that require community-based solutions (Mileti, 1999).

There has been an emphasis on community sustainability and creation of 'disaster-resistant communities' in planning for hazard events. In the United States this has resulted in a shift in policy which has started to put control and responsibility for hazard mitigation and prevention into the hands of local communities, and emphasized consideration of long-term impacts and costs of projects, not merely short-term gains. In Canada, a hopeful sign in moving towards community approaches to vulnerability can be found in a federal government initiative. The Department of Public Safety and Emergency Preparedness Canada has held two rounds of consultations (1998 and 2002) with provinces, territories and stakeholders to develop a national disaster mitigation strategy (NDMS) to enhance Canada's ability to both prevent disaster and promote the development of disaster resilient

communities in the nation (Hwacha, 2005). According to Hwacha (2005) there was strong consensus in these consultations on a couple of key issues; namely, the need for the Government of Canada to take leadership to address the 'piecemeal' nature of disaster response- essentially a complex coordination issue – and (as noted earlier) the need to involve and empower communities with special attention to "ensuring risk reduction measures do not transfer risk to other areas or potentially increase risk from other hazards" (Hwacha, 2005, p.514).

Mileti (1999) neatly summarizes the principles of sustainable hazard mitigation into six essential components which offer keys to the use of management (and mitigation) strategies in reducing vulnerability. They have particular relevance to the community level of adaptation. The components include promotion of disaster resiliency, inter and intra-generational equity, economic vitality, quality of life, environmental quality, and participatory processes. These characteristics reduce vulnerability to any type of threat, including natural hazards, and reduce recovery time. In a general sense they have considerable overlap with other vulnerability measures (such as Jones and Shrubsole's [2001] "Measures of Vulnerability").

2.6.1 Community level analysis of vulnerability

Community level responses have, in fact, found favor as a level of analysis of vulnerability. Specifically, vulnerability has been assessed, in some instances, in terms of the capacities that exist within a community to reduce vulnerability (Pearce, 1997; Wates, 2000). Vulnerability is then linked with the concept of 'capacity assessment'. In the work done by Wates (2000) he has created a matrix to clarify risk specific information (e.g., hazard type such as flood) and link it with information attained through community profiling. In his framework vulnerability and community capacities are both considered simultaneously in terms of physical and material vulnerabilities / capacities, social and organization vulnerabilities / capacities, and motivation and attitude vulnerabilities / capacities. It is significant that Wates (2000) advocates the use of participatory risk assessment methods at the community level to conduct these assessments which link vulnerabilities and capacities.

Such frameworks articulate a need to look at different sources of vulnerability and at how capacities need to be enhanced or developed to handle different types of vulnerability. In Canada, Laurie Pearce (1997) evaluated vulnerability models used in B.C. and observed the benefits of community-wide or even a regional approach to vulnerability, with a strong emphasis on public participation. That said, there has been a clear acknowledgement that local level planning and implementation of risk reduction initiatives cannot be undertaken by community stakeholders in a vacuum; rather strong leadership from all levels of government is required (Mileti, 1999; Hwacha, 2005).

The concept of community-based management is promoted also by Yodmani (2001), who, in looking at disasters in the developing world, called for 'community-based disaster management' which he described as risk reduction programs designed primarily by and for the people in disaster-prone areas. He maintained that disaster mitigation using government and institutional interventions alone does not address community dynamics, perceptions, or priorities. Like Pearce (1997), he emphasized the need for public participation if an effective disaster management program is to be implemented. Risk reduction actions must be taken by a wide range of stakeholders ranging from the individual, family, organization, business and public service (Yodmani, 2001).

Laurie Pearce's (1997) research evaluated known Hazard Risk Vulnerability (HRV) models currently being used to assess and ultimately reduce the vulnerability of communities. She defined and used the following objectives in assessing the models: 1) whether it constituted an all-hazard, non-specific approach (also advocated by Jones and Shrubsole, 2001); 2) use of a community-wide or regional approach instead of a single site approach; 3) a planning versus engineering approach or orientation, and; 4) an overall goal of sustainable hazard mitigation.

When Pearce (1997) tested eight models she found none of them met all of these objectives. She also found that while many people she interviewed believed that an HRV analysis is important for disaster mitigation, she did not find many people who could do them.

Pearce (1997) concluded that the following characteristics were critical to implement a vulnerability analysis model within a community: public participation; risks must be easily communicated; available data must be accessible; it must be educational for the community at large; it must provide for equity across the community; scientific and technical knowledge should be included; hazards and risk factors must be comprehensively identified, and; the process must be politically legitimate. Pearce's HRV model also identified other variables that were important to the planning process. Some of these included a wide spectrum of stakeholders (including local media), adequate risk communication as part of the process, no dependence on expensive technology or highly trained experts, and trained facilitation to develop consensus in decision making. A concluding point that she made in explaining her HRV model is that the community does not simply go through vulnerability assessment; rather it is an *ongoing* effort. This is consistent with the idea of a dynamic model of vulnerability discussed earlier. Pearce's (1997) work in Canada offers a basis for looking at the success of decision-making processes in engaging and meeting the needs of communities, and fostering resilience to a hazard such as floods.

2.6.2 Community attachment and hazards

Disasters occur because people live or work in hazardous areas. Yet when there have been organized attempts to move people who have experienced a natural hazard away from their homes, it usually fails (Burton, Kates, and White, 1978). In fact, attachment to place has been seen as strong in most societies (Burton et al., 1978; Hewitt, 1997). In many cultures, sense of place and use of the land for livelihood activity are closely entwined, making a move out of a hazardous zone very difficult. People do not typically move even when they have experienced a disaster unless they have explored all loss reduction options available to them- i.e., there is no more capacity for action other than to move, change resource use, or a combination of both - depending upon their circumstances. They are then said to have reached an 'intolerance threshold' (Burton et al., 1978, p. 225). Thus for many, the price of living in a hazardous zone may include costs of adjustments or adaptation as necessary, and even the loss of life and wealth (Burton et al., 1978).

These high levels of attachment to hazardous zones also offer opportunity to engage people in vulnerability reduction activities. More specifically, attachment, and particularly the emotional connections to place, is one of the factors that is implicated in motivating people to work at improving community circumstances (Manzo and Perkins, 2006). This suggests it ought to be possible to encourage people to organize around vulnerability issues within their community as a consequence of their attachment. In the Red River Basin town of Ste. Agathe in 1997, even though the entire town was flooded, people remained and rebuilt. It is important to explore the nature of such attachment to help understand how people may come together to address community vulnerability over the longer term, and not just in the immediate aftermath of a flood. Understanding why people remain in communities after such devastation would also provide insight into what beliefs and values they hold and apply to risk-related decisions, both individually and collectively. There is no doubt that places where people reside tend to become 'endowed with meaning' and a 'steady accretion of sentiment' (Manzo and Perkins, 2006, p. 337).

People's attachment takes not only an emotional form, but can also be viewed in terms of participation and empowerment; members of a community group feel empowered to have influence over members of their own community (McMillan and Chavis, 1986). This would allow, in a hazard context, for coordinated community adaptation to a hazard. Bonds to places - particularly affective ones- can help inspire actions because "people are motivated to seek, stay in, protect and improve places that are meaningful to them" (Manzo and Perkins. 2006, p. 335).

When disasters actually strike there is a disruption to place attachments, causing feelings of loss and alienation (Hummon, 1992 in Manzo and Perkins, 2006) which can potentially be used to mobilize communities who have suffered a disaster (Manzo and Perkins, 2006).Understanding attachment offers insight for planners then on how to engage communities in community planning processes (Manzo and Perkins, 2006) whether during recovery after a natural hazard event, or in striving to facilitate community participation as part of a sustainable floodplain management strategy (Werrity, 2006). Understanding

communities and participatory processes at local levels are fundamental to vulnerability reduction (Blaikie et al., 1994; Pearce, 1997; Mileti, 1999; Yodmani, 2001)

2.7 Culture and values in decision making

Thompson, Ellis and Wildavsky (1990) propose two views of culture, one consisting of what they refer to as 'mental products' meaning values, beliefs, norms, rationalizations, symbols, and ideologies. When people share such values and beliefs, it is referred to as 'cultural bias' (Thompson et al., 1990; Gallois and Callan, 1997). The other view of culture sees it as referring to the total way of life of a people – their interpersonal relations as well as their attitudes. A 'way of life', then, consists of a viable combination of social relations and cultural bias (Thompson et al., 1990); 'social relations' refers to patterns in interpersonal relations.

Culture is the sifter of ideas, and certain ideas and assumptions become widely adopted and are expressed in human social interactions and behaviors (Spindler, 1977). In fact, individual deviations from cultural norms, and the attendant rationalizations, are sources of culture change. Change occurs when old ideas are rejected or reinterpreted, or new ideas are integrated with old ideas, or frustrated individuals begin to threaten the values supporting the cultural system (Spindler, 1977).

Culture is frequently seen as external to, and temporally prior to, individuals because individuals do not invent it, but are rather raised into it. It then exercises a constraining influence on an individual's behavior. Individual behavior, because of the person's existence in a sociocultural environment is then controlled to some extent by factors such as custom, institutions, language, or technology. 'Sociocultural' systems include agreed upon institutionalized solutions which influence most individuals to behave in a predictable manner most of the time, but never all of the time (Spindler, 1977).

Humans exploit their environment through culture and society to have needs met. Environmental changes, or natural hazard events, must then be viewed in a highly

sociocultural context. A flood, for example is not merely a physical event. It can mean severe loss and a shattering of assumptions about the world and self with devastating personal consequences (Janoff-Bulman and Frieze, 1983). It can also mean opportunity for a research grant for some, and financial gain for others (such as a construction company). The significance of such events to individuals (and collectives) is social and cultural.

Social and cultural variables influence human interpretation of events within the environment, deliberations of what actions to undertake, and what adaptations emerge with new experiences and new knowledge. Such factors cannot be overlooked in a comprehensive understanding of vulnerability to environmental hazards. Historically, human cultures have often been able to successfully address problems through creative solutions, new behaviors, and adaptations to environmental pressures.

2.8 Values

What people want and how they might go about getting it are captured in their values. When it comes to decision-making, then, human values are typically an intervening variable (Rokeach, 1973). Humans organize their values hierarchically into values systems, clarifying different priorities. The words that actually symbolize the core ideas or values in a society are extremely vital to its continued existence. If they were eliminated, individuals would have no standards that they could apply across various situations they face, meaning that they would not know how to go about meeting societal demands about behaving competently or morally (Rokeach, 1979). They would also not have the linguistic tools necessary to rationalize or communicate how best to act.

Values are a set of preferential standards in making selections of objects and actions, resolving conflicts, invoking social sanctions, coping with needs, or coping with claims for social and psychological defenses of choices made or proposed. They are learned, and are developed through experiences – such as pain or pleasure, social approval or disapproval (Rokeach, 1979; Chong, 2000). When large numbers of people have similar experiences, and they are shared (communicated), discussed, and evaluated by the persons involved, then the

common appraisals of the situation build values standards that are generally accepted across society, or culture or even cross-culturally.

Values have been depicted as 'criteria' for evaluation of a situation, and in fact values are one type of belief – termed 'evaluative beliefs' (Rokeach, 1973) – beliefs used to judge whether an action, a desired goal, or an object is good or bad, or an action right or wrong (Mangun and Henning, 1999). Unlike attitudes, values transcend specific objects or situations. Attitudes and general beliefs are less enduring than values (Rokeach, 1973; Bengston, 2000). Attitudes incorporate a number of organized beliefs around an object or situation. Beliefs in general reflect what people believe to be true about an object which influences attitudes towards that object (Bengston, 2000).

The antecedents of values can be traced to culture, society and its institutions, as well as to personality (Rokeach, 1973). Values always have a cultural content, being shaped by both the constraints and opportunities of both the social system and the biophysical environment (Rokeach, 1979). They also represent a psychological investment, as people strive to employ values that are consistent, congruent, and appropriate when considered in the context of other values, general beliefs, and norms (Bengston, 2000). There is an affective quality to the criteria (values) (Mangun and Henning, 1999) as well as a conceptual quality. In other words people have emotional as well as intellectual attachments to their values positions. In fact, values can have cognitive, affective, behavioral and motivational components (Rokeach, 1973). Values emerge as a result of all cultural, institutional, and personal forces that act on a person over their life. At the societal level, they are conceptions of the desirable type of society; that is, conceptions which are held by members of the society. They are then applied to society (Parsons, 1968 cited in Rokeach, 1979).

After decades of work in values research, Rokeach (1973) developed two lists of values considered common across all societies – though often there are great differences between cultures as to the order of priority of the different values. The lists were created through a review of values literature on American and other cultures, personality-trait studies, and he and his colleagues' own work with students and adults in North America. Part of Rokeach's

work was done in Canada at University of Western Ontario. Ultimately a vast array of work was synthesized into a relatively small number of commonly-held values that are divided into two distinct values groups; namely, *intrinsic* and *instrumental* values (Rokeach, 1973). The two groups are defined as follows: 1) desirable end-states of existence (also called *intrinsic or terminal values*), and 2) desirable modes of behavior that will lead to the attainment of the desired end-states (called *instrumental* or *means values*) [Rokeach, 1979]. Examples of intrinsic values include a comfortable life, sense of accomplishment, happiness, etc. Instrumental values include, for example, such characteristics as ambitious, capable, forgiving, etc. The instrumental values are further broken down into two groups. 'Moral values' refer to what 'ought' to be the preferred mode of behavior (e.g., honest, loving), and 'competence values' are more personal (versus interpersonal) values that are concerned with ensuring personal adequacy (e.g., logical, independent). Rokeach's (1973) defined a value as follows: "a value is an enduring belief that a specific mode of conduct or endstate of existence is personally or socially preferable to an opposite or converse mode of conduct or endstate" (p. 5).

Rokeach's (1973) separation of instrumental values from intrinsic (or terminal) values provides a starting point for considering values in the Red River Basin. This separation suggests that it is important to separate 'goals' from the 'means' taken to achieve the goals; that is, intrinsic from instrumental values. This was an important consideration in this study which explored what values people hold, as well as their beliefs and assumptions about both how vulnerable they are, and how they (or decision-makers) should act to best protect their communities from future flood damage. Both desired outcomes and means of achieving them were investigated. When values are organized along a continuum of relative importance they constitute a values system (Rokeach, 1973).

Values hierarchies can also occur at both the individual level (e.g., how to spend flood-proofing money; whether to attend a certain church) or at the broader institutional and societal level (e.g., how to set organizational goals; how to compensate flood victims). In fact, Rokeach (1979) maintains that the value concept is equally meaningful whether applied at the individual, institutional, or societal level.

While all societies face problems that require adaptive change, there must be some minimal measure of the original values system that remains or the social order will break down (Vickers, 1968 in Rokeach, 1979). Values then can change, and are neither fully stable nor unstable – they both endure and change (Rokeach, 1973; Chong, 2000; Bengston, Webb and Fan, 2004).

Cultural norms and rules are also different conceptually from values. Social rules that emerge from social norms include expectations that people have and which lead to certain assumptions about what behavior will occur. They are applied to very specific situations (Rokeach, 1973; Gallois and Callan, 1997), are consensual, and external to the person. Alternatively, values are internal, somewhat more personal, and more independent of the situation (Bengston, 2000). Norms also are often the result of application of several values, and a single value (or value change) may lead to the rejection of previously accepted norms (Rokeach, 1973).

Etzioni's more recent work on values (1996) takes a somewhat different approach than Rokeach, with claims that values flow strictly from the notion of 'community'. His emphasis is upon what societies and communities need to become a 'good society'. He argues that a good society nourishes both social virtues and individual rights – in equilibrium. He suggests that assessment of a society's values requires analysis of the measure of individualization permitted and, conversely, the amount of commitment to community as a whole (i.e., tension between *self* and *community*). Too much of one, he maintains, will result in social pressures towards the other. He advocates that moral order, where limits are placed on one's choices through dialogue at the community level, is better than the notion of widespread 'freedom' touted in the West. In discussing Western civilization, and particularly the United States, he advocates social order that is based on a group of shared values, criticizing the current practice of maintaining social order largely through dependence upon law and regulation.

Gallois and Callan (1997), while focusing primarily on cross-cultural comparisons of values, also note (like Etzioni, 1996) that one of the key dimensions for assessing differences in values includes looking at the tension between individual freedom and welfare of the group, and they also note that balance between the two are sought within individual cultures. They suggest, as does Etzioni (1996), that an important starting point in any analysis of values is the contextualizing frameworks that may operate at a societal level. In Canada that would be the Canadian Constitution and Charter of Rights and Freedoms that set up normative criteria and values that are both publicly proclaimed and generally accepted.

Etzioni (1996) also warns that all commonly held, and identity-creating, community values (which he calls 'core' values) are not necessarily 'good' just because they are widely embraced. They can be based upon some false or erroneous beliefs, ones that are commonly held. Similarly, he points out the importance of not assuming that because a democratic process is followed in decision-making – namely one in which all members of the community are free to participate –that the outcome is morally superior to other possible methods. He also suggests that there are variations on democracy, some of which may be superior to others at a community level – such as using a process of consensus building. Etzioni (1996) suggests the possibility that values that emerge and are maintained through better community processes may result in a better society (meaning a better balance between the private and the public good). Careful evaluation of the democratic processes at a community level is part, then, of a comprehensive values analysis.

2.8.1 Measuring values

A few brief comments will be made about methods used to identify and evaluate human values. The study of values is not confined to a single discipline or narrow range of research methods. Traditionally the two main approaches used to study values have been: a) to analyze the weights assigned to criteria (values) for preferential behaviors in situations in which people must decide on certain actions, or b) to rank a list of values according to their importance (Rokeach, 1973; Rokeach, 1979).

Rokeach (1979) outlines several frequently employed methods by which institutional values can be identified. The first is content analysis, by which institutional documents or publications are sifted through for their values perspectives (Bengston et al., 2004). These are then summarized into a set of value positions.

A second methodology is to interview 'institutional gatekeepers' – significant people within an organization whose personal values are likely to reflect the influence of socialization by that particular institution. Similarly, clients of an institution can be interviewed under the assumption that they have been especially influenced by the institution (e.g., graduate students in a particular faculty; devout churchgoers). Alternatively, it is also possible to measure the *perceptions* (rather than personal values) of gatekeepers or clients, asking them to reflect on the values of the institution.

There are various means of measuring individual values, each with their own limitations. A phenomenological approach might be taken where people are asked directly about their values; inferences about values may be drawn through observing behavior. Alternatively rank ordering of a predetermined list of values may be done by a targeted group (Rokeach, 1973). A 'values projective technique' might also be used where participants fill in the blanks in ready-made statements of beliefs choosing responses from a provided list. Each potential response falls into one of several pre-determined value categories (Spindler, 1977).

As a final comment about studying values, there are two uses of the concept that have been used quite differently in research. For example, a person can 'have a value' or an object 'has value'. Rokeach (1973) notes that there has been much debate about which is a more useful to a general understanding of human beings and the problems they face. He suggests that the object-focused approach is based on a very one-dimensional view of values, is reductionist, and that the alternative view of values – namely values as criteria – is generally more useful in a broader social analysis of complex problems. In this research study we asked participants to consider their values in the context of what they value. What they claimed to value was used as an aid to help them reflect upon their own values – a phenomenological approach. This was ultimately to help explore people's preferences for one action over

another based upon what they value and their goals, and not an attempt to deconstruct the characteristics – or 'values' – of one favored object over another.

2.9 Culture and Perception of Risk

There is a broad discourse on the relationship between culture and risk found in the social science literature. A review of this topic is beyond the scope of this project. However, a few comments will be made on a couple of key contributions of this literature.

One important social science perspective views perception of risk as a social process (Thompson et al., 1990; Wildavsky and Dake; 1990; Denney, 2005). This notion was originally encapsulated in a 'grid-group theory', and later reworked as the 'cultural theory of risk' (Thompson et al., 1990). This area of research was largely based on work originally done by Mary Douglas in the 1970's and expanded in the following decades (Society for Risk Analysis, 1996). Cultural theory, in this context, is used to explain attitudes of individuals and collectives towards various kinds of risks. It attempts to explain, and even predict, what kinds of people will perceive which hazards to be dangerous (and how dangerous) (Wildavsky and Dake, 1990). Risks are then seen as culturally biased and highly influenced by socially embedded values and beliefs.

Flowing from this, decisions or choices to engage in risk taking or risk avoiding behavior are made based on the way of life or worldview adhered to by the decision-maker (Denney, 2005). Fear and perception of danger, then, depend upon cultural bias. In the original cultural theory of risk, there were five idealized types of cultural bias – with five attendant personality types – that influence risk perception. Whole societies could even be identified as falling into one of these types. It was also possible, within one society, to compare competing ways of life chosen by individual people, and the differences in their associated perceptions of risk.

Feelings and communal activities based on previous disaster experiences constitute a 'disaster subculture' (Hussain, 1997). In fact, disaster subcultures may be defined by their own distinctive beliefs about many aspects of their hazard exposure – not just risk – such as beliefs about the nature of the hazard itself, the level of risk, use of technology, ideas about forecasts or warnings, or beliefs about the nature of damages. Subcultures may also be defined by disaster-related feelings, values, and norms to guide behavior. Frequently these are based on previous experience and knowledge, locally interpreted.

In general, there are significant differences in various cultural theories that assume that individuals' orientations towards risk, and their way of life are related. In one theory, an individual's perceptions are determined by their way of life (and therefore largely static); in another theory, individuals select the best way of life for themselves (a rational approach). Another cultural theory suggests that individuals are actually mosaics of ways of life, and can wear different 'hats' in different social contexts, changing and adapting actions and attitudes dependent upon what is most appropriate at the moment (Society for Risk Analysis, 1996).

At this point it would appear that cultural theories, as they relate to risk behavior particularly, are multiple, and evolving. It is not clear how successful they are at actually explaining behavior, and empirical evidence is weak (Thompson et al., 1990; Society for Risk Analysis, 1996) or, at least inconsistent (Tierney et al., 2001). Even so, there is support for the need to investigate cultural factors, including values and beliefs, in disaster research. Advocates for more social and cultural research related to hazards and disaster, emphasize the need to understand the complexity of the contexts in which risk reduction activities are determined (Oliver-Smith, 1995; Mileti, 1999; Tierney et al., 2001). Particularly, such research will underscore the importance of competing interests, and the wide range of political, social, and economic factors that come into play in any type of decision-making to reduce vulnerability (Oliver-Smith, 1995; Mileti, 1999). Also, it is well-accepted that cultural expectations and practices inform hazard-related behaviors and practices as they inform all other aspects of social life (Tierney et al., 2001). By way of example, several salient cultural characteristics that influence vulnerability to, and outcomes from, a hazard event include not only ideas about risk taking, but also notions about individual versus collective responsibility for loss

reduction, ideas about individual rights and ethical responsibilities, belief in the efficacy of technology, pro-social behavior (such as altruism and volunteerism), expectations of institutions and occupational groups (e.g., police, military), and pre-existing social groupings and status (Wildavsky and Dake, 1990; Oliver-Smith, 1995; Tierney et al., 2001). In a study of human values, decision making, and vulnerability, these are worthy of attention even if cultural theories to explain their relationship to vulnerability are incomplete.

2.10 A focus on values and decision-making

"Decisions about natural disasters — planning for them, responding to, and recovering from them — are ultimately questions of ethics, choices between different societal values of normative standards" (Beatley, 1999, p.1). It is necessary to acknowledge the role of values, and more broadly, culture, in how people perceive a problem such as a hazard threat and how they organize to respond to problems. In general, values constitute the individual and collective beliefs that provide a frame of reference about what is important or desirable. Creation and maintenance of values occurs in the complex of economic, cultural, political, psychological, and economic processes in which human groups exist. Values influence how people interpret facts and what solutions to a problem they are willing to consider, and those that are rejected. When people engage in deliberate, intentional human behavior, the behavior is guided by 'valued' goals and priorities (Fenton, Harris, Miller and Smith, 2001). Preferences for certain mitigation actions then are founded upon human values, as well as other cultural variables.

Values are subject to some flux, contrary to popular opinion. While values (like character) tend to be a more enduring and stable part of personality, different contexts stimulate different values sets or sides to our personalities (Fenton et al., 2001). People tend to make decisions, and also behave, in response to the values that were activated at the time that they made the decision. When confronted by a problem, people can simultaneously experience both 'role conflict' and 'values conflict' depending upon their group identifications at the time. The instability of values, according to Chase and Panagopoulos (1995) means that the conditions determining their generation need to be better understood.

Identification processes are seen as important factors in the process of valuation (Chase and Panagopoulos, 1995). Group identities, and the social framing of issues under consideration, influence which values are activated during decision-making. Social factors, which impact individual decision outcomes, may include for instance: whom you are with at the time decisions are made, your desire to belong to the present social group, and perceived rewards for compliance with group opinions. In general, the social framing of an issue, as well as individual values, beliefs, perceptions, and information significantly influence the decision context (Fenton et al., 2001). People can be swayed with regard to their attitudes and perceptions of a problem, and they may present a values stance that is expedient at the moment, depending upon their social circumstances. These short-term variations may not reflect their private values; sometimes private valuations are deliberately hidden to avoid censure in public forums (Fenton et al., 2001). This shows the importance of ensuring that public participation opportunities, such as those for determining flood mitigation opportunities, allow individuals to express their values even in the face of opposing views. Otherwise, it is possible that initiatives that are contrary to commonly held values in a community might be implemented – with negative long-term implications; or conversely, publicly proclaimed values may dominate decision-making yet lead to unsustainable practices.

It is not unusual, particularly in economic analysis, to consider that preference for one thing over another constitutes a manifestation of values. One of the most difficult areas in analyzing preference as a manifestation of values is that in choosing, for instance one action over another, it is often not clear why it was chosen, or what *specific* attribute of the selected action was judged as better. Attributes that may differ among mitigation alternatives could include, for example, such attributes as cost, aesthetics, or implications for future generations. It is important to know which attribute may be driving decision-making. This can only be revealed through dialogue about values with stakeholders. In other words, selection of certain actions in the face of a hazard does not reveal values through the *choice* alone. Rather, the attributes of the preferred choice must be examined to get a good understanding of values. This means that some methodologies in values research – such as contingent valuation – can only give a superficial view of the values held by participants.

They do not get at citizens ethical and moral concerns (Clark in Guerrier, Alexander, Chase and O'Brien, 1995).

The dominant use of cost benefit analysis as a tool in both environmental (Clark in Guerrier et al., 1995) and hazard management decision-making (Beatley, 1999) is heavily criticized for its underlying ethical assumptions (and attendant values); namely, that all benefits and costs can be quantified, and future concerns and needs can be captured through discounting. Furthermore, the very people whose lives are impacted directly by mitigation decisions may not have the ability to interpret the assumptions made in cost benefit analyses of mitigation options. When cost benefit analysis is applied to mitigation decisions it means that cost is the primary criterion used in determining what an acceptable level of risk is. This is an ethical choice (Beatley, 1999) which means that humans define the level of vulnerability that is acceptable. Many local mitigation decisions have implications also for future generations, or other geographic locations, that may be impacted by today's decisions. It is essentially a value judgment when it is decided who ought to be taken into account when mitigation decisions are made (and how); those whose interests are considered are referred to as the 'moral community' (Beatley, 1999).

Beatley (1999) and Stefanovic (2000) have asserted that values are manifest when choices must be made, and when tradeoffs between competing values positions exist. In discussions of decision-making, while much reference is made to the notion of ethical behavior, and adherence to broad generalized principles, Stefanovic (2000) iterates that broad principles are often of little assistance in concrete dilemmas – such as what to do to minimize flood risk. This is because tradeoffs, in reality, often relate to selection between two 'goods' rather than the more obvious decision scenario where one need make a decision between a good and a bad option. In fact, according to Fenton et al. (2001) most often there is actually cross-cultural agreement on what is generally 'good'; it is the priorities, not the values, which differ across cultures. This is an important point of analysis in comparing the responses of different groups or communities to similar hazards. The differences in priority of values, rather than an absolute difference in values, may be most significant in explaining support for different mitigation schemes.

Typically, people seek to belong to groups with similar values to themselves; they also construct values frameworks that reflect their personal goals. It is understandable that communities, held together, for instance, by common geography and common needs, may foster a collective set of values that broadly influence decision-making and are reinforced through community life. These would constitute a mutual public set of values, referred to as 'social valuing' (Fenton et al., 2001), where values are openly proclaimed and deemed good. They may or may not be prescribed to all community members or society at large, depending upon the values and the perceived need for conformity to those values in question.

Values do change, and at various rates, dependent upon the type of value, the individual or collective involved, and the issue under scrutiny. Values are altered, for example, through the development or acquisition of new values, or due to new interpretations or strategies for realization of existing values, or through new priorities (Fenton et al., 2001). Values can change at a faster rate when people obtain new information or experiences. These can alter attitudes, beliefs, and perceptions. Hence, it is possible, for instance, that the period post-flood, when residents have had a new and tangible experience with a flood, may be a time of considerable values flexibility in relation to disaster planning and mitigation. There may be openness to reinterpretation of old priorities and values stances. Potentially this may be a time of opportunity for values change. In fact, according to Fenton et al. (2001), 'values confusion' is a common problem when people attempt to identify new goals.

Complex decisions, including mitigation decisions, are characterized by values conflict. Various stakeholders frequently have different interests and perspectives that they wish to protect. In the disaster mitigation context this sets the stage for highly contentious issues to emerge when mitigation policies or programs are considered. Ethical judgments concerning natural disasters – how to prevent, prepare for, respond to, and recover from them – are made by a large number of individuals and groups ranging from management professionals, the various levels of government, to citizens and their communities. Debate among the many stakeholders helps to clarify interests and values and make more explicit the trade-offs that must eventually be made. In fact, according to Parker (1995) *debate* is the chief means of

influencing values in a democratic society and an essential process of effective decision-making.

Linked to this, of course, is the importance of values in defining what rights and expectations people have – related to self, community, agencies, and authorities. In the flood context, values help determine what people expect from government in the form of protections from losses and in assistance post-disaster, and expectations of other social entities such as NGO's, local groups, or fellow citizens. Values also are implicated in the questions that people ask or raise about an issue like natural hazards risk, and which facts are brought to bear in interpreting the problem (Stefanovic, 2000). By extension, values also influence which methods are adopted in, for example, selecting mitigation options.

Beatley (1999) found that ethical 'dilemmas or quandaries' are often faced by those involved in many aspects of hazard mitigation (Beatley, 1999). His research team concluded that ethical and moral concepts and language pervade mitigation discussions. Interestingly, their research also showed that there is considerable variation in the perception of whether ethical issues are important or even present in natural hazards policy among decision-makers interviewed (Beatley 1999). There are implications in this lack of acknowledgement of the role played by human values in hazard management. It promotes the limited dualistic perspective in problem solving of which Stefanovic (2000) is critical; namely, that one can divide assessments of human experiences cleanly into two categories: the scientific and objective assessment on the one hand, and the value-laden and subjective on the other. Some decision-makers then view that the perspectives that they bring to bear are value-free (i.e., objective) thus limiting debate on other perspectives related to flood problems and solutions. It is possible that acceptance of such a limited expert perspective has also resulted in acceptance of the short-sighted flood mitigation actions that are now recognized as partial contributors to vulnerability.

The goal of sustainability, as in sustainable floodplain management, is essentially part of a larger push for endorsement of a set of values that is consistent with the sustainable development paradigm. Stefanovic (2000) suggests that the means of shedding light on

problems with human patterns of thinking about our environment is to expose assumptions people hold, value judgments people make, and even cultural paradigms that condition how humans see the world. These are critical to understanding unsustainable practices, and moving towards increasing sustainability.

With regard to the role of government in decision making, Stefanovic (2000) notes the importance of identifying what remains 'unsaid' in government policy-making and program development, and not just what is explicitly stated. What remains unsaid is as revealing of underlying values as what is explicitly stated. Evaluation of how decisions have been made to relieve vulnerability to flood in the Red River Basin should therefore include consideration of what has *not* been proposed by decision-makers as well as what has been.

Beatley (1999) states that when decisions need to be made, the choice that appears ethical - meaning in line with commonly held values or principles - is often a function of the way that public tradeoffs are structured and presented. In other words, often behavior is guided more by our interpretation of ethical principles in a given situation than the principles themselves, i.e., how ethical principles should be applied in the situation at hand. Implicit in this stance is that values may be manipulated through the control of information and / or power. With government as the primary communicator of mitigation options and information on flood risk, it is important that full disclosure of options be given to individuals and communities without appreciable bias. Beatley (1999) identified full disclosure of information as essential to the proper exercise of professional responsibility in hazard mitigation.

Government is generally the voice for public values because officials hold responsibility for protecting the public good. Governments proclaim their values to promote support for policies and programs they desire. In fact, values may be either (or both) personal or public, with the two not necessarily synonymous. Research has shown that there is an increasing expectation that government, in fact, will and should deal with such emotionally laden issues as disaster impacts (Beatley, 1999). This raises the specter of citizen reliance upon government to represent their values. Yet, the environmental literature warns that government may have considerably different values from other stakeholder groups (Mangun

and Henning, 1999). So why does the public allow government to exercise such decision-making authority? Fenton et al. (2001) states that for individuals to surrender responsibility for difficult decisions to others (e.g., leaders, government), is understandable because freedom of choice can be difficult for people due to the anxiety and uncertainty that some types of decisions provoke. Added to this, people have difficulty articulating or rationalizing their own value stances (Fenton et al., 2001). This highlights a need for new methods to help people to better reflect upon and express their values in ways that will help researchers to understand short term and long term adaptations to hazards.

Hazards research aimed at vulnerability reduction should help at-risk communities to explore alternative and creative solutions for reducing vulnerability in ways that are both practically meaningful and socially relevant. Simultaneously, the role of government in vulnerability reduction should be clarified. Specifically, there is frequently conflict between the value of 'protection of the public good', which falls into the domain of government, and the value of 'personal freedom' at the individual level. Mitigation actions, or actions during a flood emergency, at times require one value be prioritized over the other. This is a contentious value-laden issue that divides the very stakeholders that should be working cooperatively to find solutions to vulnerability.

In general, there is much that humans take for granted that is embedded in our culture and history and which sets the framework for rules and principles that ultimately guide our actions (Stefanovic, 2000). Foundations of human motives are similarly rooted in culture and history, and few people take time to articulate and substantiate their value systems. Understanding human vulnerability and mitigation decisions requires that citizens be engaged in some meaningful processes of self-reflection on what is important and why (i.e., reflection on values).

Hazard mitigation occurs in a 'morally diffuse environment' (Beatley, 1999) where there is no easy answer to the question of who is responsible for mitigation and safety. As Beatley (1999) points out, 'everyone' is responsible, and yet 'no one' is clearly responsible. Who citizens hold responsible when disasters occur, who should pay and how much for mitigation

(or for compensation) is a values issue and often a source of values conflict between citizens and agencies in authority. A broader issue is that of distributive equity (Beatley, 1999) as people have values and beliefs related to who should benefit from mitigation (or compensation) and what criteria is acceptable in determining who benefits and by how much.

To conclude, the role of values and the broader notion of ethics, underlie human attitudes and responses towards natural processes such as hazard events. Human values influence, for instance, the range of problem solving strategies (namely mitigation) that are considered, whose interests dominate, whose are protected , what information is brought to bear on the problem and how it is used, and ultimately the choice of action taken or not taken. The study of values provides fodder for a fuller examination of problems facing humans, helping to define problems more cogently and from different angles. Values study is not, according to Stefanovic (2000), intended to generate some 'ultimate' values that people must adopt. However, it should add significantly to our understanding of what motivates people, including government institutions, to take the actions that they do when faced by a challenge.

2.11 Chapter summary

In regions where flood disasters are common, mitigation actions are taken to prevent or reduce the vulnerability of human settlements. These mitigation actions are part of a wider complex of floodplain management activities that are defined by the relationship between human and physical systems. Traditionally, decision-makers enthusiastically endorsed structural approaches in vulnerability reduction; however, these measures have often had limited impact on flood vulnerability. Following decades of flood disasters, hazards and disaster researchers have increasingly sought to understand social as well as the physical sources of vulnerability so they might better determine solutions. Thus the amelioration or attenuation of social vulnerability has become an important concept in floodplain management decision-making.

Hope for a more secure future for many communities is therefore thought to lie in a more integrated approach to floodplain management, one which allows for improved use of both structural and nonstructural mitigation activities (Pal, 2002). A new emphasis on

nonstructural as well as structural measures includes an approach that emphasizes more community involvement in decision-making, capitalizes on pre-existing community capacities and priorities, and focuses on resilience in the coupled physical-human system. Part of the integrated approach also requires a change in how humans and their institutions address flood vulnerability. To engage in a new integrated approach to vulnerability reduction, communities will need to articulate their priorities and be party to the tradeoffs that management decisions entail (such as sustainable communities over economic development). These are value judgments. As we try to move both communities and floodplains in sustainable directions, and minimize vulnerability to flood hazard, the capacities and constraints related to these goals are found in social variables such as perceptions, beliefs and values.

CHAPTER 3: RESEARCH DESIGN AND METHODS

3.1 Introduction

This research examined the social construction of flood vulnerability in the Red River Basin. This exploratory study was predominantly qualitative, focusing on context and understanding of a complex system. It involved studying the real world context of flood-related decision making, particularly at the community level. It explored values and perspectives of institutions involved in flood-related issues, and the many facets of vulnerability creation that emerged through the findings.

The support for this research was based on two key assumptions that are well documented in the flood disaster literature and in local analyses of the causes and events of the 1997 flood in the Basin. Those assumptions were: there is insufficient information on social factors implicated in the creation of vulnerability in the Basin, and specifically a lack of understanding of the beliefs and perspectives of at-risk community residents particularly in communities outside of the City of Winnipeg. The research explored flood-related perspectives, decision making processes and mitigation decisions in the Basin. The study included several methods of collecting empirical data both from residents of the Red River Basin affected by mitigation decisions and from institutional representatives at municipal and provincial levels.

Emphasis in this study was on how communities mitigate the flood threat through planning for flood events and in the management of the Red River Basin floodplain. Due to a need to limit the scope of the research, the emergency and recovery stages of flood management were not a major focus as these stages of flood management raise unique shorter term planning challenges.

The primary data collection techniques used to achieve the objectives are listed in Table 3.1.

Table 3.1 – Data collection methods

Data collection methods included
▪ Survey on community organization, beliefs and values related to flood risk management
▪ Documentary Analysis ▪ (floodplain management reports/documents 1950-1999)
▪ Key informant interviews on institutional values
▪ Visual methodology (photographic) with community participants
▪ Interviews with community participants
▪ Focus groups within the two participating communities

3.2 Introduction to documentary analysis

The broad purpose of the documentary review was to offer some insight as to the nature of documents created and solicited as part of both governmental and community decision-making in the Basin. The review was also to serve as a backdrop for decision-making, and to show an evolution in how institutions- and to a lesser extent, communities- have documented their analyses of flood issues through the creation of various reports and briefs. In short, the data collected helped reveal the progression in documentation of floodplain and flood management issues that has transpired in roughly the last fifty years. The analysis of the documents also added some contextual richness to this study by grounding it in actual documents generated by planning authorities (and others) over five decades. This documentary analysis also provided some insights into the values/perspectives of the institutions conducting (or soliciting) reports on flood-related problems.

The first objective of this research, which related to mitigation decisions and the use of structural and nonstructural measures, was accomplished through consideration of secondary data; namely, existing documents related to flood management and mitigation options in the Basin. The time frame for analysis was after the 1950 flood to 1999. It involved documentary analysis (Fraenkel and Wallen, 1996; Bell, 1999) of a selected number of government and private sector documents located in the provincial government's Conservation and Environment Library, 160-123 Main Street, Winnipeg. Here, relevant flood-related publications are made available to the public. The content analysis was qualitative and exploratory (Rose, 2005) and investigated various themes related to flood risk management and vulnerability reduction as well as identifying emergent themes.

A set of themes for use in analysis (e.g., sustainability goals; soliciting public input in decision-making) were identified prior to reviewing the documents; these themes were identified from the flood related literature and reports on the causes of the 1997 flood. The themes appear in Appendix B. The determination and evaluation of mitigation measures (structural and nonstructural) and decision-making activities related to flood and floodplain management were a focus of the documentary review (e.g., Royal Commissions; public meetings on flood control). Evaluations of documents were also done with consideration of recent criticisms of Canadian floodplain management practices and their relevance in this Basin (Shrubsole, 2000), and if (and how) such practices might be influencing community vulnerability. Latent content (in addition to manifest content) within documents was considered in an attempt to determine some of the subtle preferences – i.e., related to vulnerability reduction – that may be operating. These included, for example, preferences for structural mitigation measures that were unstated but nonetheless evident.

According to Rokeach (1979), an advantage of content analysis of institutional documents is that it may provide important clues to institutional values, although he recommends an additional methodology be used to cross validate findings (Rokeach, 1979). This was done in this study through interviews with institutional key informants discussed below. Types of documents that were reviewed included, for example: government flood damage reduction strategies, post-flood assessments, terms of reference for consultant reports on mitigation options, and community planning documents. The complete list appears in Appendix D.

3.3 Documentary analysis method

There were several challenges in this undertaking. It was determined that the review must be restricted along several dimensions. First, an appropriate time frame for document selection had to be determined. Documents were restricted to the time period following the 1950 flood which, as noted earlier, was a pivotal event in flood management history in Manitoba resulting in major mitigation efforts. The time-related endpoint of documentary analysis was 1999, following several key documents and analyses after the 1997 flood; thus the review

was bounded in time. It was also determined that the focus was to be key documents that are quite readily available rather than solicitation of obscure or protected documents used exclusively by government departments; the documents, therefore, were to be reflective of a general social discourse on flood risk management. These procedures were subject to the approval of the researcher's committee.

The initial search began in fall 2003. There were 101 records that initially were identified as relevant to floodplain management and flood risk management in Manitoba. In one case, a compilation of reports (i.e., successive annual reports of the Winnipeg Dyking Commissioner) were treated as a single entry even though many annual reports were reviewed to investigate changes in the Commissioner's reporting over roughly five decades. In total, 30 of the 101 documents (or compilations) were reviewed in detail (See list in Appendix D).

Of the 101 reports given consideration there were many that were of an exclusively technical orientation with minimal interpretation of data for use in decision-making. These were text presentations of data related to a narrow and technical area of investigation; examples included documents that were exclusively on soil mechanics, geotechnical investigations, risk mapping, monitoring program data, etc. While obviously important to understanding the science behind local flood risk, the eliminated documents were clearly not intended as communication tools which could either facilitate or explain decision-making related to flood risk by communities, local governments or, in a more general sense, policy makers. Consequently, their relevance to this research was minimal. Further culling became necessary to narrow the search. Eliminated from review were some reports related to areas of the province that were far north of the southern part of the Basin, or in areas which differed markedly in geography such as Duck Mountain, or which were limited to specific tangential subjects such as dam construction for generation of hydroelectric power. Documents that related to Reserve Lands exclusively were eliminated due to the unique social and economic character and circumstances of these areas. The focus remained primarily on riverine flooding during spring thaw or summer rain events.

A Documentary Analysis Framework shown in Appendix B was developed by the researcher for use in the documentary research based upon a review of two literatures particularly - general literature related to flood vulnerability reduction and literature related more specifically to the Red River Basin. Both literatures suggested certain trends in flood-related management practice and decision-making. In some cases, these trends appear throughout flood related research (e.g., traditional cost-benefit analysis in determining mitigation activities); in other cases the pre-selected trends / themes were identified from reports specific to Red River floods. Therefore, the framework consisted of a series of trends or themes likely to be evident in text data relevant to flood management in this context. All themes listed within the framework were thought to suggest, at a minimum, a certain worldview (or value system) in addressing flood issues which may potentially impact approaches taken to mitigate flood risk in Manitoba.

Once the documents to be used in analysis were identified (Appendix D), specific data was recorded on each document - title, year, authorship, and particular note of who solicited the report (if applicable and evident), as well as the general purpose of the document (following Bell, 1999). It should be noted that for some of the older documents authorship and intent were sometimes difficult to discern. Notes were also made of events that may have triggered the creation of the document depending upon the year it was created (e.g., a recent flood, institution of the Canada-Manitoba Flood Damage Reduction Agreement).

Documentary data analysis consisted of manually going through each document and examining them using the Documentary Analysis Framework in Appendix B. Notations were made about how each documents' content related (or not) to themes within the framework (i.e., was the notion of public safety presented? were issues of equity raised? was public input to decision-making discussed?). Notes were also taken related to the context in which each theme was discussed in various documents (e.g., with regard to public input to flood related decisions- was the document in favor, or uncertain, or not in favor, etc). Quotes that particularly well illustrated a theme were also recorded within the data tables and ordered by date. The theme of 'Public Trade-offs' was omitted from consideration when it became evident that documents failed to present the issues of floodplain management or flood

management decisions as trade-offs between two items of value (e.g., development priorities over vulnerability reduction). [While such trade-offs are characteristic of hazard management they have not found their way into public discourse in any clearly defined way - a fact clearly worth noting in an attempt to create more astute and knowledgeable citizens and decision-makers.] Patterns related to the nature and content of the documents were identified and the percentage of documents which illustrated / discussed each theme was tabulated. Other issues, problems, or themes related to flood risk management that emerged naturally from the review were also recorded on the document data recording sheets for inclusion in analysis and discussion of the documentary findings.

In Chapter 4 the findings from the documentary analysis are presented. The results are presented according to the themes investigated. The documentary analysis was done prior to key informant interviews and helped inform the discussions with the institutional informants.

3.4 Key Informant Interviews

The purpose of the key informant interviews was to gain insights into institutional perspectives and values on, for example, such topics as vulnerability reduction, community participation in decision making, sustainable floodplain management, as well as new directions in which flood risk management may be moving within the Basin.

The key informant interviews consisted of semi-structured interviews with nine key individuals who represented decision-making institutions, those who were themselves local decision-makers, or those who were influential within non-government organizations or community groups involved in floodplain management in the Basin. Informants were determined through contacting key agencies and organizations, or municipal leaders, and asking them to identify the person they considered best suited to represent the values / perspectives of their agency in relation to flood-related matters; these are characteristics of institutional 'gatekeepers'. The term 'gatekeepers' is applied to such personnel who are capable of reflecting the values and priorities of the agency of which they are a part (Rokeach, 1979, p. 53-54).

To ensure participants' anonymity and permit them to offer critical insights into their own organization, other organizations, or Basin communities, their specific organization is not named. However, the interviewees were all affiliated with one of the following types of institutions in the Red River Basin:

- (1) Provincial department with floodplain management mandate
- (1) City of Winnipeg department with flood-related mandate
- (2) Municipal councils (rural) managing flood risk
- (3) Non-governmental organization with floodplain management mandate
- (1) Non-governmental agency with emergency response and recovery mandate
- (1) Grassroots activist group (community-based)

Prospective participants were contacted by telephone. Interviews were in-person and lasted approximately one hour. Respondents were asked to answer the questions from the perspective of an employee of their organization. The Interview Schedule of questions asked of them is found in Appendix C. The semi-structured format of the interviews allowed for qualitative data collection; the focus was on eliciting a range of rationales, assumptions, and potential values stances held by informants' respective organizations. Hence, questions were deliberately exploratory and open-ended. Several questions or sub-questions were eliminated in analysis when many of the gatekeepers could not address those questions primarily due to their role in the organization. One such question was 1(b) which asked for information related to staff hours and funds within their agency that are allocated to flood-related issues.

All interview data were transcribed following the interviews for clarification. Data was read and reread and impressions noted. A data set was developed using responses to each question and sub-questions, categorizing information according to responses (coding). These detailed categories were organized into broader themes that emerged from the data. In some cases responses also were accompanied by experiences, behaviors or rationales that were highlighted in interpreting the data. Recurring issues were noted as were novel / contradictory perspectives. Following this, responses and categories were cross-referenced with the institutional affiliation of the respondent (rural municipal, City municipal,

community-based group, non-community based NGO, provincial agency). Patterns and relationships that were particularly relevant for addressing the research objectives were highlighted for further discussion and integration with other data sets. It was particularly helpful that the community survey had been completed in advance of the key informant interviews as it allowed for exploring (with institutional representatives) some issues that had arisen at a community level earlier in the research (e.g., lack of community involvement in local mitigation decision-making; preferences for structural measures; perceptions of 'expert' agencies). Quotes were occasionally used in presenting the findings from the key informant interviews when they most effectively captured the real-world experiences and beliefs of the interviewees, or subtle nuances indicative of the relations between communities and institutions. Similarly, anecdotes shared by key informants were used when they were particularly powerful in illustrating an institutional perspective.

3.5 Community data collection overview

Community values and perspectives related to flood vulnerability were examined at an individual level and community level in this research, with the emphasis on the latter. This was deemed most appropriate for two reasons. A 'community' by definition can be conceptualized as a collective with shared values and norms, sharing a common history and identity, and in which there exists affect-laden and reinforcing relationships (Etzioni, 1996), such as exists in smaller Basin communities. This made community level analysis suitable for the researcher's purposes. Equally important, the level of community is where many mitigation decisions and hazard vulnerability analyses are made (Yodmani, 2001), making it appropriate for research into flood management decision-making. It was also necessary to gather some of the data at the individual level so that community residents might have time to reflect upon community values, and meet privately with the researcher to openly share their thoughts and feelings about their community.

A case study approach was adopted with two Basin communities as the cases. The nature of the research - looking at community values, beliefs and their relationship to community responses to local flood risk - required in-depth exploration of a complex of social, economic

and political factors. This could only be done through intensive work in a very limited number of communities over several years. The two communities chosen for study were Emerson and Ste. Agathe, both in Manitoba. They are described in detail in Section 3.6. The community research was done in two distinct stages, the results of which appear in Chapter 5 and Chapter 6. The first part consisted of a Community Survey done with samples of residents from each community, as described in Chapter 5. The Survey was on community organization and perspectives related to flood vulnerability. It is located in Appendix A. The second component of the community research involved a small group of volunteers from each community who were willing to participate in a lengthier process. They were asked to take photographs of objects, places or people related to: what they perceive as important community values, their attachment to the town, concerns they have about flood vulnerability, and sources of reassurance of security in the face of the local flood risk. After the photos were developed, the participants were then individually interviewed and asked to describe the meaning of the photos they had taken. Each person was also asked a series of other questions during the interview that related to their community's future and flood vulnerability. Those questions appear in Appendix E. A socio-demographic information form used to collect personal data on each participant appears in Appendix F. The photographs and interview data were reviewed for insights about community attachment, capacities, perspectives and values, and how they relate to mitigating flood risk and creating a more resilient community.

At the conclusion of the above data collection, the participants from each community met in a focus group to discuss a visual display of photos and commentary put together by the researcher. This helped to validate the community findings. Afterwards, an archive (poster) of photos and commentary was provided to each community in appreciation of participants' time and commitment (refer to Appendix H to view the two community posters). The range of community research activities provided valuable insights into how community residents view their communities and the flood risk, how they believe flood mitigation should be done, and what values relate to their judgments about their own flood vulnerability.

3.6 Community selection

The two communities from the Basin in this study were selected based upon a number of criteria. These criteria appear in Table 3.2 below. All communities exhibited close proximity to the Red River, being at risk in 1997, engagement in recent mitigation actions, a population size of less than one thousand people, and support (non-monetary) for the research. The decision to focus the research on communities with populations of this size was based on two considerations. Firstly, there was a need to limit the size of the communities to facilitate values analysis as larger communities are typically characterized by more diversity in values and more transient populations making identification of common values and social relationships more difficult. Secondly, in Manitoba the vast majority of communities in close proximity to the Red River and south of the large urban center of Winnipeg also have populations of less than 1,000 people.

Table 3.2 – Criteria for community selection

General criteria to be used in selection of the two communities
All communities in the study
▪ Immediately adjacent to the Red River
▪ At risk in 1997
▪ Support of local leadership for human values research
▪ Engaged in recent mitigation actions
▪ Population size - less than 1000
Variable characteristics of communities in study
▪ Nature of collective action / community initiative related to flood issues
▪ Cultural heritage
▪ Economic activity; resource base
▪ Proximity to Winnipeg
▪ Outcomes from flood event in 1997

Once the basic criteria for identifying potential communities were determined and a short list of communities was created, a number of secondary elements came to light that were also considered. These included: cultural heritage, type of community initiative related to flood mitigation, level and type of economic activity, proximity to a large urban center, and

experiences and outcomes from the 1997 flood event. While applying these criteria to the selected communities provided more diversity in community characteristics, the primary purpose of the study was not to compare the values / perspectives in the two communities but rather to be aware that contextual differences exist which may explain some differences in values and perspectives related to floodplain management issues. These are discussed in the data analysis in Chapter 6. After applying the criteria above, the two communities selected were Ste. Agathe, a predominantly French-Canadian community within the Rural Municipality of Ritchot, and Emerson, a culturally diverse community at the Canadian-American border within the Rural Municipality of Montcalm (refer to map, Figure 1.1).

The town of Ste. Agathe is located at a relatively high point on the west bank of the Red River between Winnipeg and the Canada / U.S. border along Highway 75. Floods have therefore been less of a threat here than in many other communities along the river; hence, in 1997, Ste. Agathe did not have a permanent ring dike (Rasid, Haider and Hunt, 2000). During the 1997 flood, the town received considerable attention as it was completely inundated. Unexpectedly, the flood waters had come overland from behind the town rather than from the river side where a temporary earth embankment had been constructed (Rasid et al., 2000). This unexpected turn of events resulted in extensive damage to the entire town and additional stress and confusion for residents (Morris-Oswald, 2001). In the time following the 1997 flood, communities south of the floodway near the city of Winnipeg (including Ste. Agathe) also claimed that they had experienced water levels elevated above 'natural' flood levels due to the floodway inlet operation during the flood. This 'back up effect' at the floodway inlet was later investigated and confirmed (Burn, 1999b) although the exact extent of additional flooding has been subject to some dispute.

The population of the actual town of Ste. Agathe is generally stated as roughly 500 people; within the town boundaries proper, 118 households were identified. The community claims a high percentage of young families and a number of small businesses. Ste. Agathe's proximity to the large urban center of Winnipeg means a daily commute for many residents. There are some farms in the surrounding area, and the primary agricultural crops are canola and wheat. There is one church in the town which is French Catholic. While the numbers of

French speaking families in the town is thought to be significant, the exact number was not available. While available statistics on Ste. Agathe are minimal, there are some for the rural municipality of Ritchot within which it is located. Between 1996 and 2001 there was a population decline of 5.5% in the municipality. Median age of the population was 34.6 years, and median family income was $64,975 (CDN). For the entire municipality the number of families with a French mother tongue was 29% (Statistics Canada, 2001). Among the sample of residents participating in the community survey, French only was spoken in 41% of households, 53% reported speaking both French and English, and 6% spoke English only. The municipal government responsible for Ste. Agathe consists of a municipal council with a mayor and four councilors, one of whom is from Ste. Agathe. This council is responsible for about 777 square kilometers of area and 5,500 people.

Emerson, Manitoba is located on the Canadian-American border immediately adjacent and east of the Red River, 90 kilometers south of Winnipeg. In 1997, the town dike along the Red River at Emerson, which had been reinforced during the event, held back flood waters with little damage within the confines of the dike. The peak flood level had risen to within 0.66 meters of the dike height in Emerson. However, outside the Emerson dike, and generally considered part of the community of Emerson (and sampled in this research), lies an area referred to as West Lynne. Here there was some damage to dwellings and property. Since 1997, West Lynne has been diked.

Within the town of Emerson, a town council consisting of five individuals and a mayor handles most issues, including flood preparation and response. The town of Emerson is surrounded by a variety of farm operations. The population of Emerson is roughly 655 people. The last census reported 358 dwellings. Median age according to the 2001 census was 45.6 in Emerson, and median family income was $45,082 (CDN). Since 1996, the population of the town has declined 11% (Statistics Canada, 2001). Emerson's location at the border also results in significant employment in customs and immigration services. There is a small Royal Canadian Mounted Police detachment (the federal police force) located in town. In the 2001 census, 68% of residents claimed to be Protestant, and 14% Catholic. Among those who participated in the community survey conducted for this study,

English was spoken in the home of 90% of respondents, both English and French in 7% of homes, and a language other than English or French was spoken in 3% of homes.

3.7 Community survey

3.7.1 Community survey design and analysis

The community survey consisted of a qualitative semi-structured interview schedule used in both Ste. Agathe and Emerson respectively (refer to Appendix A). The analysis was qualitative, aiming for understanding of community lived experiences within the floodplain. The survey was the first data collection activity undertaken and provided a general community-based context to the research. The questions explored the nature of community organization, social and communication networks, residents' views of their community in the context of living with a flood threat, participation in and awareness of flood mitigation activities, and perceptions of local vulnerability to flood. The individual questions helped the researcher explore community characteristics and social processes that influence action (or inaction) related to coping with the flood risk.

Interviews were conducted in-person with a sample of residents in both Ste. Agathe and Emerson. The interviews were conducted by the researcher and three research assistants. The interview schedule was first piloted with three participants in the community of Ste. Agathe, and minor alterations were made to the instrument. Survey households were selected using a random number table in Ste. Agathe and a combination of random selection and snowball sampling in Emerson. Each interview lasted between 30 and 60 minutes. The sample size used in Ste. Agathe was 17, or 14 % of the 118 households identified. In Emerson, 31 households out of 358 were surveyed or 9%. Surveys were conducted in 2002 in Ste. Agathe and 2003 in Emerson.

To begin the analysis, the interview data was transcribed and read many times for increased understanding. Responses to the questions were then entered into QSR N4 qualitative software (QSR, 1998) which was used in analysis. Data was coded and then organized

thematically into a subset of issues with implications for community vulnerability and flood risk mitigation. Emergent categories were identified as the data was worked with. Recurrent themes were noted. Effort was made to understand people's rationales for their answers (e.g., why participation in mitigation decision-making appeared low).

3.8 Community photography method

The second phase of community data collection was centered on the use of reflexive photography. Participants were asked to take photos within their communities and in subsequent interviews to describe their meaning (Hurworth, 2003). The interviews were to reveal the image makers' (participants') intentions in their selections of what to photograph in order to gain valuable insights into the characteristics of the community in the context of flood risk. It also permitted participants to consider past history and present issues as they chose. This allowed revelations about the spectrum of change that has transpired within their communities in relation to flood threat. While the content of each photo (e.g., river, dike) was often self-evident (i.e., what appears in it), the level of analysis emphasized in this research was the *referent level,* meaning 'what the photo was of' from the perspective of the person who took it (Emmison and Smith, 2000). The researcher had participants contextualize the photos by having each 'tell stories' about the meaning of the photos they took. The intent of the analysis of the photos was to use the photos and referent meaning to involve the community in defining the relationship between vulnerability to flood and community values and characteristics. This was in part accommodated by the broad nature of the task – i.e., participants were given significant latitude in what to photograph. This allowed them to determine what might best communicate their lived reality in the floodplain.

Participants were identified through the list of survey participants in Phase 1. At that time, survey participants had been asked if they might be willing to be further involved in community research related to flood issues. Of those whom expressed an interest, eight participants were chosen from Emerson and seven from Ste. Agathe. Individual meetings were held with each participant to explain the nature of the photography exercise and the

related focus groups. The time commitment had to be carefully explained as the photography project was done over a considerable period of time.

After these individual interviews, there was a group meeting of participants in each community; at this time ethics protocols were presented and disposable cameras distributed. After Stedman, Beckley, Wallace, and Ambard (2004) participants were asked to take 2 photographs each (in case one was of poor quality) of 12 places, things or people - i.e., 24 photos in total. The photos were to illustrate: what they perceived as important community values, their attachment to the town, concerns they had about flood vulnerability, and/or sources of reassurance (of security) in the face of the flood risk. The instructions were discussed by the group. They were reminded to focus on community attachment / values and vulnerability simultaneously through their photographs. The most significant challenge was to offer sufficient instructions without actually suggesting specifically what they might photograph (e.g., town dike) and every effort was made to not lead participants in what items to photograph. More specifically, during the group meeting a couple of participants did ask if certain photos would be appropriate (e.g., floodway) and these were briefly discussed. However, the researcher kept this discussion to a minimum and told the group that they would not be given suggestions of what to photograph, and that it was important that they make the selections of what to photograph as independently as possible.

Another particular challenge in conducting the photography research was finding a time of year when everyone was willing and able to take the photographs at the same time and be available for individual interviews shortly thereafter. Although more ideal visually, summer was not an option due to people's schedules. Photos were taken in fall.

Several weeks after distribution of the cameras, they were collected, films developed, and individual interviews were held with each participant to review all the photos they had taken. The interviews were evaluative and interpretive (Nelson, 1991; Holstein and Gubrium, 1995). Furthermore, a series of questions were used to expand the discussions on community perspectives related to flood vulnerability during the interviews. These questions appear in Appendix E. They were discussed only after the meanings of each photograph were explored

with participants. After the interviews in each community were completed, analysis was done as described below, using ATLAS.ti (ATLAS.ti, 2000) qualitative software. Then a focus group was conducted in each community to discuss the preliminary findings of the photography / interview data. The participants in the focus group were those who had taken photos and been interviewed. The focus groups were held within community buildings in each community.

More specifically, after some initial coding of the photographs and interview data, the researcher chose a subset of photographs to use in each community's focus group. They seemed to best reflect each community's assets / character and perspectives related to flood vulnerability. During a formal PowerPoint presentation, slides were shown of the (selected) photos of a particular object / place / person, accompanied by a selection of comments made by various participants who took photos of that particular subject matter. During the focus groups these photographs and commentary - organized according to key themes in the data - were powerful tools for directing the discussion. Each photo was discussed so a range of views on the meaning of the subject matter could be solicited, and note was taken of any errors in interpretation by the researcher or of conflicting attitudes within the community. The photos and commentary were used to bring some issues into public focus, expand the discussion of complex issues, and allow for a further exploration of community perspectives.

Notes were also taken on the process and content of the focus groups both by the researcher and a research assistant. Paraphrasing of participant comments back to the group was done as necessary for clarification purposes. Participant observation of the focus groups expanded the researcher's understanding of which issues inspired strong emotive responses at the group level - such as the flooding of the cemetery in Emerson, or the role of the church within the community of Ste. Agathe, or the general frustration of residents in communicating with government agencies. These observations were included in the discussion of research findings.

The group process also offered a check of the validity of key aspects of the photography analysis - i.e., did the issues highlighted reflect community beliefs and sentiment, and were

they sufficient. Furthermore, the focus groups offered a participatory approach to further interpret the relationships between community characteristics and perspectives, and vulnerability to flood.

The group viewing of photos seemed to be a rather empowering experience for participants. The members of the group took the opportunity to express and to assert their views around issues that were contentious within the community, and to express strong emotions, both positive and negative. The use of anonymous comments from the earlier interviews which were presented along with the photos (i.e., there was no indication of who had made each comment) was particularly helpful in eliciting some discussion of opposing views within the community in a less threatening manner.

The viewing of the photos was also accompanied by many 'oohs' and 'aahs'- particularly in one community– and there seemed to be some indication of community pride and a sense of cohesiveness among the community participants. The photographs acted as visual triggers for memories of past floods and other aspects of community history and connectedness (Parker, 2005). In both communities the discussions during the focus groups were lively and spurred many conversations about living with the flood risk. Many of the photos that had been taken by participants were shown on PowerPoint slides in the time before the formal focus group got underway and after the focus group was ended - looping over and over again. This was done because, while over 150 photos were taken by residents of both communities, only a fraction could be included in the formal presentations. People were welcome to stay and view all of the photos after the focus group itself came to an end to ensure they had seen their own photos. People seemed to enjoy this very much.

Participants were also told that a poster consisting of a sample of photos and comments would be provided to the community in gratitude for their participation. This was done several weeks later and the posters are now in public buildings in both communities.

Analysis of photography, interview and focus group data

There were three analytical levels at which the photographs themselves were viewed (Emmison and Smith, 2000). As noted earlier, the focus of this research was the *referent* of each photo (i.e., *what the photo is of)*; this relates to the intention of the photo taker (what they were attempting to capture through the subject matter). Photos were also reviewed at the *content* level - in which *what appears in the photos* was identified. In both communities there were some objects of which there were several photos taken (e.g., town dikes). The interviews with the participants, however, clarified the intended meaning (referent level analysis) of each photo, which varied from person to person. The final level of photograph analysis was the *context* of the photo-taking exercise. The *context* in this situation (meaning *what use is made of the photo*) included what the participants in this study were asked to do, and the general context in which the photo was taken (i.e., flood research to capture community perspectives and perceptions of vulnerability).

Data collected as a result of photographs and participant interviews was transcribed and inserted into ATLAS.ti (ATLAS.ti, 2000) qualitative analysis software. Considerable time was spent examining and comparing the various photos and commentary from the interviews. The photo interview data was classified and coded according to both the photo referents and themes that came out of discussions of the photos with participants. This was an iterative process as codes were refined as necessary. Typical of an interpretive paradigm, emerging ideas were noted. The data was then considered within context - both the broader Red River Basin context and individual community context. Similarities and differences between the two communities were examined and considered within the contextual differences - i.e., whether there was significant flooding in 1997; the nature of social organization, etc. The semi-structured survey done in the first phase of community research helped inform the contextualization and interpretation of the photograph / interview data in phase two.

More generalized interpretations of community perspectives on flood risk were found in identified patterns in responses made by community residents in the photography interviews, the earlier surveys in both communities, as well as the final focus groups in each community.

Seemingly contradictory findings were identified and discussed within the Red River Basin context (e.g., both the preference for and the uncertainty related to structural mitigation measures). Some segments of text were deconstructed to operationalize values, attitudes and beliefs at a community level. Quotes by community residents were used in some instances to better illustrate community perspectives or sentiments; they are found within the formal discussion of the community findings in Chapter 6.

Analysis of the emerging pattern of community vulnerability was further enhanced by references to the existing literature which contributes to and overlaps with the definition / understanding of vulnerability within a floodplain (e.g., public participation in mitigation; vulnerability assessment issues; sustainable floodplain management principles). The application of the existing literature expanded the understanding of the social construction of vulnerability in the discussion of research findings. In the final analysis and discussion of findings, the two community cases jointly (and when appropriate separately) were described in terms of how decision making and vulnerability are affected by values, attitudes, beliefs and practices identified at the community level.

3.9 Vulnerability analysis and framework

The analysis of data collected on institutional and community perspectives and values related to flooding and floodplain management was done in the context of the vulnerability reduction approach to hazards and associated frameworks. Vulnerability frameworks highlight the importance of certain factors in addressing flood vulnerability such as level of public participation, appropriateness of the decision-making processes, power and equity issues, the range of mitigation options available, and the types of institutional involvement, etc.

The vulnerability analysis was based, in part, upon Wisner et al.'s (2004) and Blaikie et al.'s (1994) PAR model of disaster, with emphasis on the construction of social vulnerability. In their oft-quoted framework, the authors encourage a careful analysis of the social context in which disasters occur, and consideration of how linked social, economic and political variables can contribute to the progression of vulnerability in a society - particularly over a

large time scale. The analysis of the data from this study is presented through an adaptation of Wisner et al.'s (2004) Pressure And Release (PAR) model which is a more recent version of the Blaikie et al. (1994) PAR model. The adaptation is presented in Chapter 7.

3.10 Limitations and Delimitations of the Research

The nature of the social construction of vulnerability, the focus of this research, was investigated using a qualitative approach. As such, data was analyzed for themes or categories, and interpreted for meaning. The use of visual data collection through the photography exercise was consistent with phenomenological research as the photos and statements made by participants were detailed in an effort to capture the essence of community understandings about flood vulnerability. The process for identifying and integrating the key factors influencing vulnerability (through integrating varied sources of data) was largely inductive and iterative. The different sources of data and methods of collecting information (documentary, interview, visual and group methods) allowed for triangulation of the evidence that led to identification of themes contributing to vulnerability.

One of the challenges in this research related to the reality that vulnerability can be created or alleviated at all three stages of flood management: planning, emergency management and recovery. For the purposes of a single research study, however, it was necessary to limit the primary area of investigation to one stage. Thus, in examining social and cultural variables that are implicated in vulnerability, this research focused upon the planning and pre-disaster mitigation aspects of flood management - in essence, the 'big picture' issues where possible. There was, however, some overlap with the other stages - particularly that of flood preparation - not surprising given the inter-connected nature of vulnerability creation.

The use of a case study method to examine vulnerability posed a challenge due to the varied types of communities that exist within the Basin. The need to limit the research to two communities decreased the external generalizability of the findings to all communities. However, this was countered by the depth of investigation in the two communities, the multiple methods of data collection, and the ability to triangulate findings. In addition, during the community focus groups, the participants themselves assessed and provided feedback

related to the internal generalizability of the photography / interview analysis by confirming its applicability to their own communities.

At a practical level, the commitment required - most notably by participants in the photography exercise and associated group processes - limited the number of communities that could be studied. However, the more in-depth focus allowed community residents to spend considerable time considering their beliefs, values and perceptions of community vulnerability and decision-making processes. This was necessary to the fulfillment of the research objectives. Limiting the study to two cases permitted an examination of social processes and decision making that would simply not have been possible across multiple communities. While one cannot say that all results apply generally to all communities, it is likely that enough common experiences and perspectives exist (within the Basin) that the potential contributors to vulnerability found in this research should be highlighted in planning for the future.

CHAPTER 4: INSTITUTIONAL VALUES AND PERSPECTIVES

4.1 Why examine institutional values?

'They (flooded homes) must simply be regarded as examples of unfortunate and possible improvident settlement.'

(1951 government document about several hundred flooded homes on the Red River)

The above statement, particularly after the events of 1997, seems like an enormous understatement of how human behavior in the floodplain has contributed to flood-related damages and grief in the Red River Basin. Certainly the emergence of vulnerability approaches was in partial response to researchers challenging the notion implied in the above statement that flood disasters (and others) are caused largely by forces outside of human control. That is, the old thinking of hazards as accidents unrelated to human activity has been disputed over recent years (Hewitt, 1983; Blaikie et al., 1994; Mileti, 1999). But how have decisions within the broader Red River community evolved since this statement was made at a time when the misfortunes of flooded citizens were viewed primarily as the trials of unfortunate individuals rather than societal problems requiring societal solutions? To address this question, we must look to the institutions which have responded to flood hazard in the Red River Basin, and find out what values, beliefs and actions are driving the search for security in the floodplain. That is the purpose of the research described in this chapter.

This chapter identifies institutional values and perspectives on flood related issues that emerged from the data; these values and perspectives have evolved in the Basin within the last fifty years and are relevant to how flood hazard is addressed. The analysis underscores how institutional values can contribute to or detract from vulnerability and what they reveal about broader societal values. The emphasis here will be on examining several types of institutions- including those longstanding institutions mandated to address issues related to floodplain management, i.e., prominent institutions with mandates related to flood control, response or recovery, and those that have emerged to deal with community-level flood related concerns.

In very general terms 'institutions' are engaged in the transmission and implementation of a set of values related to their respective areas of responsibility (Rokeach, 1979); institutions "function like prefabricated sets of instructions on how to do things" (Nash and Calonico, 1993, p.12). Institutions get things done. Within a society there are many areas of responsibility that are formally assigned to socially created and sanctioned institutions ranging from such diverse functions as for example, education, religious observance, and of more relevance here, water management. In the case of flood hazard management there is a wide variety of institutions that respond to the needs of both larger society and smaller collectives (such as communities or neighborhoods). Each such group or agency then assumes an important societal role, whether formal or informal. Even small local groups formed to address local flood related issues have, at the minimum, an informal mandate founded on some principles or values - perhaps values that are distinctive from larger society. Whether large or small, formal or informal, such groups exist to fulfill a social function. They also exist within a distinct social context and amid social relations that justify their existence.

The institutional analyses were done in two parts and are presented as such. Part 1 is a review of documentary data using a sample of reports and papers created by various federal, provincial, municipal and community groups over the last fifty years. The listing of documents used appears in Appendix D. Part 2 is a presentation of information obtained from semi-structured in-person interviews with institutional gatekeepers on topics related to perceptions of community vulnerability to flooding in the Basin and approaches to address this problem. Finally a Discussion section presents key findings related to institutional values and perspectives of relevance to flood and floodplain management.

It should be noted that beliefs and values of institutions and organizations within a society can also be in conflict. Thompson et al. (1990) suggest that shared values can most often be observed in relation to ways of life rather than at a societal level; groups within society do not always have the same view on every issue. Within this chapter are discussions of key values and perspectives related to flood management that are found within prevalent

government (provincial and municipal) institutions/agencies which are clearly socially sanctioned. However, there are points of departure described in this Chapter where organizations such as NGO's espoused some values that differed from bureaucratic perspectives, or where a community based activist group expressed their own value- related priorities. They all tell the tale of a democratic society grappling to find the best set of solutions to a highly complex problem amid disparate interest groups.

4.2 Part 1: Results of documentary analysis

4.2.1 Public safety as a value

Documents were searched to see if the notion of public safety was explicitly stated as a social goal or if the document was created for the purpose of addressing issues of public safety related to flooding. This was a theme that was typically implicit in documents rather than explicit. Mention was made of public safety issues with regard to the ruin of people's homes in the 1950 flood, or in more recent discussions of evacuation of communities in 1997.

4.2.2 Equity and social justice in floodplain and flood management decisions

This theme was explicitly evident in a dozen documents dating back to the 1960's right up to post 1997 flood analyses. Discussions in the 1960's already observed that Winnipeg was of particular importance when prioritizing flood protections works due to its economic importance to the Province generally. Through the 1970's, documents revealed a diverse set of concerns about equity. There was concern in individual communities about the vulnerability of some homeowners, and also opposition to government permitting the diversion of rivers for use by individuals or communities. In 1979 the Manitoba Water Commission questioned whether the Province should undertake to reimburse municipalities suffering damages if they were only slight, while expressing the opinion that compensation schemes for individuals were largely equitable. By the 1980's concerns about equity and fairness in public documents took a slight diversion as the Canada-Manitoba Flood Damage Reduction Agreement was resulting in mapping of high risk flood areas and the 'designation' of some localities as at risk. This raised the ire of some rural people (such as leaders in the town of Morden, Manitoba) who felt the designation system was unfair and the process

faulty. They objected to the designation being based so exclusively on mapping rather than an individual assessment of a community's circumstances. They thought recent local mitigation efforts undertaken were not given consideration.

By the late 1980's there was a significant court case (refer to Appendix D, Water Resources Branch, Water Management Issues, 1988) in which a claimant won damages for crop loss due to drainage works that the Province had approved. This caused some concern on the part of the provincial government that in future they would be held responsible legally for drainage related flooding. This issue of liability became of more concern to senior government.

Among the documents reviewed there was a cluster of concerns that emerged after the 1997 flood about equity. For example, public hearings revealed residents' claims that flood-proofing guidelines were not applied equitably in the Basin prior to the flood. Issues related to mandatory evacuation, and residents confusion about who had authority in 1997, prompted comments about lack of fair procedures and a need to address such issues in future planning. Also, the issue of flood damage compensation in 1997 was a painful one for all concerned. With concerns about equitable treatment of Basin citizens prominent after the 1997 flood, the Red River Floodway Operation Review Committee in 1999 (see Appendix D) stated unequivocally that their review of floodway operations in 1997 'had to start from the assumption of fairness to all Manitobans', a value-laden statement in response to the voiced frustration of local authorities in small communities.

4.2.3 Authority and top-down approaches in decision-making

Investigation of this theme was intended to reveal the extent to which documents reflected an assumption that government and its agencies assume authority as it relates to floodplain issues. This was difficult to discern from the documents through review of their content. However, early documents, as well as more recent ones after the 1997 flood, assumed or implied the authority of key provincial agencies, most notably Manitoba Emergency Management Organization (MEMO) and WCIS (although the names have changed over the decades). There was also evidence of challenge to authority by residents over evacuation in

1997, an issue raised frequently. There appears a trend to hold these agencies increasingly accountable for flooding, and for residents to agitate to assert their own rights (such as to remain on their private property or to decide for themselves whether the threat is sufficiently high as to warrant evacuation). After 1997, an IJC (1997) document encouraged the Province and communities to adopt a revised, more collaborative, approach to water management (refer to Appendix D).

4.2.4 Soliciting public input / public participation

The document review suggested that the involvement of the public in flood related water management issues is increasing in importance and scope. The earliest document reviewed with details of public involvement was in 1979 following large floods in the Province in 1974, 1976 and 1979. There was a review of flood fighting activities that included briefs on public hearings held in Brandon and Winnipeg for the Manitoba Water Commission. After the events of 1997, public involvement was recommended by the IJC as important to improving flood risk management. Also, in the 1999 government document 'A Strategy for Reducing Flood Risk in the City of Winnipeg' it was noted that there was a need for a 'public awareness and consultation program' to focus on solving the problem of flood risk in the city. Further, it was claimed 'a public consultation program must be initiated using a positive approach' (refer to Appendix D). That same year a review by the Red River Floodway Operation Review Committee (refer to Appendix D) made several strong statements about the importance of public awareness and involvement. It was suggested that the operating rules of the Red River floodway be clearly documented and available to the public to improve 'understanding / awareness.' The Committee also stated that 'broader involvement of stakeholders in application of rules, particularly during major flood years would improve communication and reduce conflict.' The members of this committee, in addition to Provincial and City officials, included municipal officials from small communities who advocated strongly for community concerns stemming from 1997 events to be addressed in future planning. While outside the scope of this document review, recent activities to select an option to better protect the City of Winnipeg, which ultimately resulted in the Red River Floodway Expansion project, involved a more comprehensive public participation process in

flood mitigation decision-making than ever before seen in Manitoba. Indeed, the need for formally instituted public participation processes may well be one of the most significant social changes related to flood planning and decision-making that emerged following the 1997 flood. Their success to date, however, has been questionable; participants in a public participation initiative to examine two alternatives for structural adjustments in the Red River Basin criticized the process. They felt the decisions were actually made in advance of their involvement and that they did not have the resources at their disposal to analyze and evaluate documentation related to the options (Sinclair et al., 2003). Both of these limited their ability to influence decision outcomes.

4.2.5 Sustainability

This theme related to the identification of sustainability as a goal for communities managing flood risk within the Basin. Documents reviewed, particularly pre-1997 documents, showed little attention to this even in passing reference, and this was not presented as a goal in any comprehensive way. While it could possibly be argued that sustainability as a concept is implicit in planning goals, its lack of attention in various documents is noteworthy and suggests that holistic approaches are still in their infancy both conceptually and practically.

4.2.6 Protection and conservation of environmental resources

Rather like the theme of sustainability, document review showed a lack of reference to these issues in the context of floodplain and flood management. Back in the 1970's the Manitoba Water Commission expressed concern about erosion control along rivers and diversion of rivers in relation to problems with flooding. Also in the 1970's the notion of controlling water levels on Lake Winnipeg was discussed in the context of how it might impact wildlife and recreation resources on the lake. After 1997, there was a conference presentation related to both the environmental impact of mitigation, and environmental impacts (such as groundwater contamination) in reference to the recent flood. The documents following 1997 also made passing reference to expanding flood damage reduction strategies to include such activities as restoration of wetlands to encourage natural storage of water during flood years. This issue of protection of environmental resources seems to have received only cursory attention in floodplain management discussions.

4.2.7 Traditional scientific enquiry versus social enquiry

The purpose of noting the nature of enquiry contained within the various reports/documents reviewed was to attempt to get a sense of how the problem of flooding has been investigated- whether from a traditional scientific approach or one more inclusive of social context. As noted in Chapter 3, reports that were essentially physical data sets were eliminated from analysis. However, among the documents subject to review there was evidence to suggest that the process used in investigating flood related issues has been clearly dominated by traditional scientific approaches. For example, in the 1950's and 60's commentary in documents reviewed showed emphasis on structural measures to protect the City of Winnipeg, and issues like property values and the problem of curtailed growth. Problems framed in this manner understandably influenced the evaluation of flood damage reduction potential towards engineering and economic analysis. Similarly, in the 1970's and 1980's various authors ranging from government departments to private consultants focused on structural options, largely assessed by economic instruments. After 1997, analyses still showed a preference for this type of investigation when looking at flood risk management in general although more social commentary was added to the reports.

Early mention of the need for investigation of the social aspects of flood vulnerability was in the earliest documents reviewed. In 1951, in an attempt to determine what would be necessary to protect Winnipeg after the devastation of the 1950 flood, an author from PFRA commented that 'social commentary' was needed in deliberations of how to mitigate flood damages in future- although how to accomplish this was not presented. In a 1970's report by the Flood Assistance Board (refer to Appendix D, Manitoba Flood Assistance Board, 1976) there was a section called the *Problem of Residents* that was only 15-20 lines long which recognized 'flooding as a personal disaster' which resulted in 'economic ruin' or 'set them (residents) back'. However, the focus of the document by the Flood Assistance Board was primarily a presentation of numbers, such as the number of applications for compensation for flooding or the limitations of compensation awards. It did not provide information about the social impacts of flooding.

In 1979 the Water Resources Branch did have a section of a report (which assessed flood control on the Whitemud River; refer to Appendix D) called 'Damages not Quantified in Monetary Terms' which began to, in limited fashion, highlight the need for less exclusively quantitative approaches to the issue of flood risk. The four specific non-quantifiable impacts considered worthy of note at the time were: 1) disruption / insecurity, 2) inconvenience felt by the community, 3) road closures and 4) cancellations. This was not detailed but did reflect a more formal acknowledgement of intangible impacts. Similarly in 1981, in a report by a task force discussing community diking projects, the authors noted that 'unquantifiable effects of flooding were documented in this study as an additional consideration in decision-making' and they included what they described as 'qualitative statement of facts regarding project consequences.'

The concept of investigating social aspects of flood events, flood planning strategies, or mitigation projects grew in prominence following the 1997 event with, for example, the IJC report and Manitoba Water Commission Report which reviewed successes and failures in flood response and mitigation. These reports did two key things: 1) described in clearer terms the wide range of impacts experienced by residents and, 2) suggested that the Province must develop a new strategy for an integrated flood plan that looks at all issues, policies and activities. This was in sharp contrast to the earlier preference for looking at flood management issues as a problem to be investigated largely from an engineering viewpoint, and through application of traditional scientific or economic criteria.

4.2.8 Technical solutions and structural measures

This theme is linked to that of a traditional scientific versus more qualitative approach to the issue of flood risk as touched upon in the above discussion. However, here it was noted specifically if there was a discussion of technological and structural approaches in the documents reviewed. There were few documents (less than five) that did not present some technological discussion. Going back to the 1950's and 1960's there was evidence of old hazards approaches as one anonymous author discussing the floodway said 'faced with the certainty of floods we could do one of two things - accept the damages from floods when they arise or take engineering steps to reduce or prevent them.' (refer to Appendix D, "The

Story of one of Canada's Biggest Excavation Projects 'The Red River Floodway' "). Other options such as addressing development issues were not given much credence. Investigations of how to mitigate damages focused on structural projects, and the costs to build various options. In the 1970's, reports for the Manitoba Water Commission in which the views of the public were solicited did raise some early cautions about exclusively structural approaches. One commissioner noted that 'large dams and reservoirs is not the answer as these have not done a satisfactory job south of the border' (refer to Appendix D, Manitoba Water Commission, Commission Meeting Briefs, 1974). Another commentator from a community just south of the floodway inlet noted that with floodway operation there was evidence of a back-up effect (i.e., water backing up south of the floodway) which was a 'puzzle linked to a lack of engineering knowledge' (refer to Appendix D, Manitoba Water Commission, Red River /Turnbull Drive Briefs, 1974). By the late 1970's and 1980's the federal-provincial flood damage reduction agreements also placed a focus on flood risk mapping, technical information and design flood calculations. Community dikes were also becoming a more major focus in mitigation efforts.

Within documents after the 1997 flood presentations of technical issues abounded with discussions of, for example, new and old structural measures, improved forecasting, and use of information technology. There was some attempt to branch out discourse about mitigating future flood damages into a discussion of water 'management' rather than strictly water movement (and storage). This attitude was found most often among nongovernmental stakeholders such as, for example, members of the Manitoba Water Commission in their review of actions taken during the flood.

It is also noteworthy that a 1999 Conference entitled *Red River Flooding: Decreasing our Risks* had a collection of 20 presentations, of which almost three quarters were predominantly technologically oriented discussions.

4.2.9 Nonstructural measures / human management

Evaluation of the occurrence of this theme consisted of identifying documents that might discuss or advocate the need for nonstructural measures as part of managing flood risk and particularly those with an emphasis upon altering human behavior in the floodplain. The earliest clear reference to nonstructural measures was seen in discussions related to the 1976 flood, such as the one report by the Manitoba Water Commission based on public hearings in Brandon and Winnipeg where there was discussion about 'new policies' related to forecasting, emergency assistance and government organizational structures. Particularly, there was mention of new legislation that permitted authorities to evacuate communities and issues related to the adequacy of warning systems. One comment made by the Manitoba Water Commission noted the need for 'media and common sense' in relation to warnings (Appendix D, Manitoba Water Commission, 1977, Review of Flood Fighting Activities).

Concerns related to zoning and building permits arose in documents in the 1980's, and then again in a more definite way in post-1997 flood reviews. These more recent documents showed that there were allegations made of inadequate enforcement of zoning prior to the flood. Reference was made also to inappropriate development where, for example, secondary dikes in Winnipeg on private property were obstructed or damaged by residents- typically for aesthetic reasons. There was a recommendation for changes to the City of Winnipeg Act to prevent this in future. There was also note of other human actions that impacted flood vulnerability in 1997, one being that some municipalities failed to follow their own emergency plans. A government-run Technical Workshop on flood risk in Winnipeg cautioned that it is important to not rely too much on emergency measures exclusively, and expounded on the importance of land zoning regulations for development and a need for review of compensation arrangements for damages in Winnipeg.

4.2.10 Evaluation of risk: what tools do we use?

This theme emerged in an attempt to identify what tools, or combinations thereof, were being used to evaluate risk. Clearly early documents showed a preference for cost benefit calculations of options going back to the very traditional analyses used to support the large structural measures to protect Winnipeg back in the 1950's and 60's. Discussions of flood

fighting activities in the 1970's noted that such activities needed to provide the best cost-benefit for the most people as the basis for decision-making. When eight town dikes were considered for construction in 1981, cost benefit calculations were used which attempted to consider local development levels.

One report by a consulting firm on the impacts of flooding on Lake Winnipeg's resources noted that the use of a cost-benefit ratio is limited in its ability to look at issues of values inherent in environmental common property resources; although a cost-benefit calculation was ultimately used by the consultants they included a section called 'Damages not Quantified in Monetary Terms' (Appendix D, G. E. Grippen and Assoc., Ltd., 1970).

After 1997 there appeared a distinct difference in discussions of flood vulnerability reduction and decision-making, likely in part due to the several detailed analyses which followed the flood. These analyses reviewed the causes of, and responses to, the flood - some completed by the IJC and the Manitoba Water Commission. The processes used in the post-flood analyses included public meetings and allowed a broader understanding of flood vulnerability from a broad range of stakeholders to begin emerging. Human creation of vulnerability began to emerge in reports as a cause to be addressed - at least in conjunction with improvement of structural measures to direct water away from highly vulnerable developments. In 1999 - in the lengthy reports of KGS Consulting as they evaluated options to further protect Winnipeg - while they clearly focused on structural measures and cost benefit analysis in their role as engineering consultants, there was an attempt to look at the potential social impacts of various options. They did render some criticism of past cost-benefit calculations on protecting Winnipeg that they perceived had not included sufficient detail.

4.2.11 Compensation

The issue of payment for mitigation actions and, beyond that, for compensation, was also considered in reviewing the available reports. It became apparent that the cost of mitigation was not an issue raised in any significant way in the documents reviewed. However, a few

comments about compensation issues and their evolution over the last few decades can be made.

First, documents back in the 1970's such as the one entitled Country and City Flooding 1974-1975-1976 by the Manitoba Flood Assistance Board (refer to Appendix D), focused on numbers of compensation payouts, and what items were or were not eligible for compensation. A Manitoba Water Commission document of the time looked at municipal reimbursement guidelines for compensation and also questioned the necessity of reimbursing municipalities for minor expenses. It also noted that the compensation scheme for individuals was seen as equitable. In sharp contrast to this, the IJC documents reviewed after 1997 contained commentary about residents' confusion and frustration regarding both flood damage compensation amounts and processes for application for compensation; the Water Commission also noted impaired response by the senior government to residents' needs related to damage assessment for compensation. It would appear residents' and communities' expectations regarding compensation and the expectations of government to better meet residents needs are increasingly well-articulated since 1997.

4.2.12 Facilitating development of local organizations

Shaw and Goda (2004) make a strong case for the importance of community initiatives to address disaster-related issues. Existence of local groups was investigated in reviewing documents to observe if there was mention of groups involved in assessment of local vulnerability or determination of mitigation efforts, or a discussion of the need to facilitate such actions. There was little in the way of commentary in this regard in documents reviewed. That is not to say that communities did not take it upon themselves to address vulnerability as can be seen in documents from the communities of Carmen and Morden – both located between Winnipeg and the Canadian-American border - in the 1980's. However, a few comments in regard to local groups can be made. A comment was made in 1951 about the need for local level planning but no indication of how this might happen (refer to Kuipers, 1951 in Appendix D who was appraising flood risk and possible actions). In the 1970's communities did express a desire for inclusion in discussions of flood control issues

(through Manitoba Water Commission hearings in Brandon and Winnipeg). This was in partial response to frustration (with past practice) and specifically with the news media as a primary source of communication about flood risk. A comment was also made that the media's interests 'are probably quite different from interests of people that are seeing their homes going under' (refer to Manitoba Water Commission, 1977, in Appendix D).

However, it was not until the events in 1997 that the importance of involving major stakeholders was iterated, and the need to build a multiple sector consensus for water management. A conference by CWRA (Canadian Water Resources Association) held in Winnipeg in 1999 referred to successes related to local organization within at-risk communities in 1997.

4.2.13 Critique of past practices in floodplain and flood management

It was thought important to identify if there was an evolution of critical analysis in how floodplain and flood management has been conducted in Manitoba, with attendant changes in how authorities and/or communities respond to flood threat. Up until 1997 documents were not highly critical of management decisions or practices. However, a few examples do exist. One Water Commission report in the 1970's reflected public concern about inadequacy in emergency response, particularly related to authority structure and communication and provision of emergency supplies. There was also criticism rendered about inconsistent application of regulations for building in the floodplain.

One commissioner also expressed support for more municipal autonomy, saying it means 'more democracy to the people.' One document by the town of Morden in 1987 offered criticism of the Federal Flood Damage Reduction Program's flood designation efforts saying 'we do not necessarily agree with the severity of the anticipated problem' as presented (see Appendix D, Town of Morden, 1987). The town was concerned about the negative impact of such a designation on community development.

In 1997 the IJC did speak out about various practices at multiple levels that were identified as contributors to the damages and losses in 1997. The post 1997 flood reviews of failures at all scales - government and community and individual - have been a significant shift in evaluation of the causes of vulnerability in the Red River Basin, away from viewing vulnerability more simply as exposure to flood waters. Of particular significance, the events of 1997 have been followed by a substantial number of recommendations for improvements and change at all scales.

4.2.14 Communication and vulnerability reduction

The review of documents also sought to identify if communication issues were a subject of discussion in reports. The oldest report to make note of communication issues was mentioned in an earlier section; residents claimed communication with government agencies was disastrous during the 1976 flood. Communication as an issue was also alluded to in the 1980's in a community document that felt the designation of communities as at-risk from flood (as part of the Flood Damage Reduction Program) was not done in an inclusive way; there was little communication with communities. The designation was based solely upon mapping.

More recent comments about communication, of which there are many and varied, can be found in 1997 post-flood analyses. One example is the review of floodway operating rules by the Red River Floodway Operation Committee (1999) [refer to Appendix D] that attempted to come up with some practical communication strategies for communicating about flood related issues with residents. One suggestion, for example, was for a brochure for dissemination to the public with details about how the floodway operates.

4.3 Discussion of documentary evidence

The above documentary review offered some insights into what institutions that have been assigned formal responsibility for flood-related matters have focused upon in executing their mandate and the processes they have utilized in decision-making over the decades. Other documents revealed the perspectives, concerns or priorities of some other stakeholders -

whether individual communities, provincial Task Forces, the Manitoba Water Commission, conference participants etc., through reports and documentary evidence.

Authorship of the documents was dominated by WCIS, other government agencies, and consulting firms- usually engineering firms. Frequently the latter were hired by government to produce the reports. There were few documents prior to 1997 that really considered the perspectives of communities with the exception of the Manitoba Water Commission briefs in the 1970's and two documents solicited and paid for by communities. Many of the documents had as their primary purposes to report on activities (as in flood fighting), feasibility of flood control measures (including specifications for various structural measures), or traditional cost-benefit calculations. These were very narrow tasks set out to the report writers.

The documentary analysis showed that following a major flood in 1974 there was an attempt to broaden the discussion over 'problems of flooding' in the Province of Manitoba; this task was assigned to the Manitoba Water Commission. They documented the concerns of the public as identified in meetings, and targeted the issue of how to improve flood-fighting activities - ranging from forecasting needs, emergency protection, to governmental organizational structure. At this point there seemed to be a recognition that the large structural measures instituted in the 1960's, while effective in reducing damages, were clearly not the entire solution. It was in the 1980's that the issue of control of development was suggested, and early mention of the need to adopt more comprehensive river basin planning and management programs to control land use in areas prone to flooding. However, motivation to engage in this more demanding approach to flood risk reduction was undoubtedly thwarted by a somewhat dryer cycle in the late 1980's and early 1990's.

The return to higher water levels, and particularly the 1997 flood, seemed pivotal in causing a significant change in documents related to flood management issues. Assessments of flood damage reduction options after 1997 still highlighted structural options and cost-benefit calculations but there was a recognition that vulnerability comes from a wide variety of factors such as population distribution, inappropriate development practices, lack of

enforcement of zoning bylaws, poor emergency response planning and communication, poor decision-making structures, etc. These more recent reports on flood vulnerability in the Basin (IJC, 1997; Manitoba Water Commission, 1998; KGS, 1999 – all in Appendix D) for the first time approached the problem of flooding from a social science as well as traditional science perspective, and acknowledged the complexity of the problems and the need for various actions on numerous fronts, including social ones. The analyses themselves were still dominated by the quantitative assessments so favored by engineers and economists, but increasingly there were formal discussions of the less tangible social contributions to vulnerability, such as inappropriate development decisions.

With regard to consideration of a wide range of nonstructural measures available in floodplain management, there was little concrete discussion of nonstructural measures in the documents reviewed. In the earlier decades even reports on flood fighting (a nonstructural measure) were limited to discussions of what was done rather than understanding the social and other impacts of actions taken. While some analyses of social issues may well appear in separate reports at MEMO's office or at provincial social services agencies such as Manitoba Health, social impacts of flood preparation and response decisions ought to be brought into broader mitigation discussions and planning.

Nonstructural measures that were discussed in reviewed documents were more limited to those with a technological aspect such as forecasting. Measures related to alteration of human behavior, like increased education or altering social priorities in land use, were given only cursory reference until 1997- again showing that the 1997 flood has contributed to a shift in thinking about flood management. There are many recommendations in analyses following the 1997 flood which encourage looking at nonstructural mitigation measures in a proactive way (IJC, 1997; Manitoba Water Commission, 1998 – both in Appendix D). It remains to be seen if this new will and perspective will successfully transition to new attitudes towards addressing flood vulnerability in the long run.

The propensity to use technical solutions to flood problems revealed in documentary analysis is likely indicative of the values of the agencies assigned by society the task to manage our

floodplain or flood events; commonly values are seen as guiding organizations' goals and strategies for dealing with problems within their purview (Rokeach, 1979). Sefanovic (2003) makes the argument that hazard vulnerability warrants interdisciplinary study because of the preponderance of reductionist disciplinary decision making which has failed to take into account the full range of factors that contribute to hazard vulnerability. She argues that qualitative methods of research deserve to be incorporated into natural hazards research. This documentary review would indicate that there could indeed be more devotion of resources and wider perspectives applied to the issue of flood management in the Basin, particularly to address non-technical issues in vulnerability creation.

It is also possible that the objectives (for floodplain management) themselves have changed since the 1950's even while the reliance on engineering solutions and cost-benefit analyses continues. Objectives related to broader river basin planning, for example, may in fact require a wider set of tools than are currently readily available to decision-makers. That would explain in part the inclination for recent documents to propose more comprehensive vulnerability reduction goals but revert to actual assessments that follow old patterns of decision-making. This was evident in the findings of this documentary review. There is a disjuncture between the objectives and the ability of the tools available to provide the necessary information to feed the broadening decision-making process.

Attitudes towards equity, justice or issues of procedural fairness have also shown some evolution in the documents reviewed. There appeared to be an increasing tendency to hold government accountable for damages from flooding, to demand fair and equitable treatment such as between rural and urban communities, and an expectation that government should also be sensitive to the needs of individuals and families in dealing with the stress and trauma of flooding. This trend may in fact portend values changes with regard to how the public expects to be treated by decision-makers in matters related to natural hazards.

It is likely that this has occurred simultaneously with the increased involvement of the public in discussions about flood damage prevention, and in the context of changes in legislation requiring public participation for review of large scale proposals for flood mitigation such as

the expansion of the Red River floodway. The public, or perhaps more accurately the various publics, are more demanding of their rights. This is not a surprising behavior perhaps in a general social climate that is increasingly distrustful of experts (Denney, 2005) and politicians; citizens are wanting in some cases - such as the expansion of the floodway - to be involved in decision-making and, in some instances, are prepared to lobby for involvement, or to wade through unwieldy consultant reports to interpret issues themselves (Sinclair et al., 2003).

It cannot help but seem beneficial to involve multiple stakeholders in the assessment of flood risk and determination of mitigation. This is certainly movement towards a more holistic and potentially adaptive means of reducing vulnerability. However, while the documentary analysis showed signs of these trends, the documentary evidence still pointed to the dominance of engineering and economic assessment techniques in the ultimate decision-making. This suggests that the change that is occurring is very slow within institutions themselves, and that the values and beliefs within institutions (such as those responsible for addressing flood management issues) are evolving only very slowly. This observation duplicates the findings of Brown and Damery (2002) who claim that such institutional 'lag' - where 'old attitudes persist and continue to take precedence' (pg. 424) are a reality and barrier to vulnerability reduction.

While the rhetoric within many of the documents reviewed suggests that authorities be more open to the inclusion of the perspectives and needs of various interest groups, there was little detail of how these perspectives might be included in vulnerability reduction. Decision-making cannot perhaps keep up with the spirit of the rhetoric; hence, the documents examined suggest that over the last five decades managerial actions within the Basin have continued to be plagued by inertia. It is to be hoped that the 1997 flood experience provides impetus for a re-evaluation of institutional values and behaviors related to flood mitigation that extends well into the future.

This inertia related to change in decision-making processes is also possibly linked to the dominance of disciplinary training among many institutional personnel; their training is

intertwined with their own values systems which then permeate the organizations they are employed in. Documents available for review did not challenge the actions of various agencies until 1997, where for the first time appeared a suggestion that agencies may need to change their approaches to flood mitigation and vulnerability reduction. While subtle, there was sufficient criticism voiced by the public, and repeated in the documents, to suggest that some beliefs about management of flood risk have been modified, or at least are open to modification at various scales.

The documents also showed at least a modicum of challenge to the concept of top-down leadership in all aspects of floodplain management, particularly with the events of 1997 and the ire of townspeople at forced evacuation. This was consistent with other findings (Burn, 1999a; Morris-Oswald, 2001). This has led agencies to begin to adopt a more defensive stand as regards flood emergency decision-making most particularly; increasingly there is a sense that flood issues and the rationales and actions of the authorities will be scrutinized by the public. The various agencies, imbued with the responsibility of transmitting and implementing social values related to management of water, floods, and floodplain activities now may have behavioral demands placed upon them by the residents whose interests they serve. In the evolution of values within a society the need for institutions to respond to societal changes is expected (Rokeach, 1979; Nash and Calonico, 1993).

There were also significant strides taken towards formalizing the involvement of residents in flood related discussions (such as the increase in public meetings / consultations). The membership of the Red River Floodway Operation Review Committee after the 1997 was also a case in point where membership consisted of rural municipal leaders (as well as expected government personnel) who advocated strongly for their communities' needs.

The results of the documentary review also suggest a shift in values related to cost-benefit evaluations for vulnerability reduction. While there is much more work to be done in developing tools that are more inclusive of a wide variety of social objectives in flood management decisions, there now appears to be a dialogue about the need for a broader

interpretation of the 'costs' of a structural mitigation project and an acknowledgement that redress ought to be done to those negatively affected, even if they are small in number.

Similarly the preference for a more comprehensive water management planning approach suggests a longer time frame in planning and in assessment of both costs and benefits. This change is a fundamental requirement to a vulnerability approach to hazard management (Mileti, 1999; Jones and Shrubsole, 2001). Also, the reports used here showed that concerns about capturing intangible costs and benefits in decision-making, whether in considering mitigation options or the success of flood emergency response, are now being presented in formal evaluations. In sum, the perception of costs and benefits is beginning to broaden to be more inclusive of less tangible variables that nevertheless highly influence vulnerability (such as lost employment hours, wetland destruction, stress responses, etc.).

This documentary data also showed that there is increasing acknowledgement within documents that human actions and decisions have allowed for inappropriate land use. Institutions are particularly implicated in their failures to enforce legislation and associated regulations regarding floodplain development (IJC, 1997) when it was not politically expedient. Perhaps this recognition will alter the behavior of government agencies so that land use decisions and enforcement activities are more sustainable.

Finally, the evolution in documents related to flood and floodplain management seemed to show a significant overall shift in conceptual paradigms related to the cause and solutions to flooding across Manitoba society. The public conceives of flood as not entirely natural, with, for example, comments about artificial levels of flooding in some communities being created through government actions (Manitoba Water Commission, 1999; Morris-Oswald, 2001). Government is consequently not free to execute its flood-related mandates without public scrutiny. As documents showed, flood damage compensation is clearly an expectation by residents (rather than a privilege) with a history of increasing compensation demands by residents both for damages that have happened and those that are anticipated in future, as with the expanded floodway. Beatley (1999) has noted that this sense of entitlement has been seen in many reports in recent years in the United States and has been described as part of an

emerging 'victim mentality' increasingly applied to those affected by disasters. It is evident that there is a shifting paradigm in hazard management where flood vulnerability is viewed as a social as well as technological challenge.

Table 4.1 – Content summary of documents analyzed

	1950-1960's (Major spring floods 1950, 1960, 1966, 1969)	1970's (Floods 1970, 1974, 1976, 1979)	1980's	1990's (Floods 1996, 1997)
Mitigation Options and Flood Protections	Emphasis on structural engineering solutions to flooding Flood protections for Winnipeg following 1950 flood	Structural options dominate Cautions about structural measures	Warning systems discussed Flood Damage Reduction Agreement program • Flood risk mapping • Tension over flood risk designation of communities Community ring dikes constructed	Structural options still dominant Flood proofing programs Technical approaches prominent • Improved forecasting • Use of information technology
Mitigation Decision Making	Cost – benefit analysis to assess structural options	Use of economic instruments to assess structural options Non-quantifiable impacts from flood recognized but not defined	Cost/benefit calculations related to community dikes	Attempts to include social variables in decision making
Public Involvement	Recognized need for more 'social commentary' related to flood issues	Floods viewed as a 'personal' disaster Public hearings following major floods in this decade	Community interest in inclusion in flood control issues/discussions Identified communication problems between communities and authorities	Collective awareness and communication emphasized Public meetings/consultations achieve more prominence
Planning		Development practices questioned Inconsistent application of land use/building regulations recognized	Early reference to need for comprehensive river basin planning Control of land use suggested	1997 an impetus to improve planning Conceptual shifts to: • Integrated flood management planning • Water 'management' 'Vulnerability' reduction goals identified Wide-range of contributors to vulnerability identified related to land use; planning approaches; emergency response issues, etc.
Policy deliberations			Flood pay-out guidelines discussed Mandatory evacuation legislation discussed Policy focus/change regarding: • Forecasting • Emergency assistance • Governmental organizational structures	Significant resources devoted to evaluating policy failures in 1997 Mandatory evacuation and compensation processes challenged by local communities IJC recommendations to government on how to reduce vulnerability

4.4 Part 2: Key informant interviews

To better understand the roles that institutional values, beliefs and attitudes play in flood and floodplain management, key informant interviews were conducted with senior personnel within a sample of organizations or agencies with a mandate related to flood or flood management issues. These key informant 'gatekeepers', from institutions listed in Chapter 3, Section 3.4, were interviewed using the schedule of questions in Appendix C.

4.5 Results

4.5.1 Agency / organization mandate and activities

The first question asked the key informants to describe in their own words the nature of their institution / organization's involvement in floodplain and /or flood management, including mandates or guidelines. They also discussed if and how their agency works with local communities.

It was evident that for the provincial and some municipal staff, the level of 'power' and 'authority' assigned to their agency largely defined their role in relation to flood related issues. Formal mandates supported by legislation were mentioned, and reference to activities such as structural or nonstructural mitigation measures were seen as necessary to the fulfillment of assigned mandates such as flood control, etc. In contrast, non-governmental agencies tended to speak in a different voice, describing their mandates with terms such as 'integrating approaches for a Basin wide point of view', or referring to the need to 'inform' stakeholders. The goals of the NGO's tended to be broader. The community-derived mandate of the activist organization was understandably centered on advocacy for community rights (such as for fair flood damage compensation), and seeking to explain to citizens flood or mitigation- related jargon and science which are difficult to interpret.

Similarly, the ways in which gatekeepers described how they work with at-risk communities varied. Government agencies referred to the legislated requirement that they work with

communities via local advisory committees when major construction works are undertaken by government. The local members are primarily appointees by local municipal councils.

The NGO's described a different type of involvement with communities founded on multiple means of communication and participation by multiple stakeholders- such as memberships in the organization, annual conferences, educational workshops, newsletters etc. Several described that they facilitate bringing in staff from government agencies to conduct seminars for citizens as necessary. Some spoke about barriers to involvement of communities with their agencies, emphasizing issues of funding and growing citizen apathy to the flood risk. The activist group was facing its own challenges in working with communities; their representative noted that the media has been a barrier to encouraging community activism. He reported that one media outlet called an activist group 'fear mongers' which was perceived as unjustified and as diminishing the group's role in the community.

4.5.2 Mitigation decision-making processes

When asked to reflect upon the existing processes for making mitigation decisions from the perspective of their agencies, some bureaucrats iterated a few salient points. Several statements that they made summarize their perspectives: 'events (floods) drive the process'; it is 'very much a political thing'; 'legislative requirements are number one (in decision making)'.

The changing political agenda was also seen as a distinct barrier to collaborative decision-making. One bureaucrat noted that he sees no fundamental change in the process for making mitigation decisions than existed before 1997.

Other participants noted that the decision-making process is currently 'disconnected and disjointed', driven by 'agency and subagency' mandates and activities. One person from an NGO summed up the consequence of this approach as 'what gets done are single objectives by single agencies'. He saw the reason for this as twofold: it is easier to adopt this approach, and an institution can 'identify with the work', meaning the agency can claim that they took

action on the problem. Perhaps this is essentially an institutional 'raison d'etre', and from an institutional point of view decreases the likelihood of budgetary reductions to the agency by senior government. There is also a tendency for institutions to see themselves as vulnerable, as this data showed. Institutions may feel in competition with other organizations with similar or overlapping mandates. This is a characteristic of institutions (Rokeach, 1979). It is also a significant barrier to collaborative and creative problem-solving.

When asked who was involved in flood mitigation decision making, interviewees within provincial or city government stated it was their agencies or other government agencies, local technical advisory committees, or community liaison committees; the latter two consisted of primarily appointed positions. Other interviewees also felt that the provincial government and its departments dictate the process. One interviewee felt differently, saying that everyone is involved - ranging from individual land owners, planning districts through government. One of his criteria for involvement was stated as: 'Who is involved' depends where danger is perceived…it is linked to risk perception.' He saw perception of risk as tied to involvement rather than focusing on capacity to be involved. Lack of local capacity to be involved in mitigation decisions was a primary concern of several NGO's. One respondent also noted that residents have not felt involved given that they were not listened to prior to and during the flood of 1997.

4.5.3 Perceptions of community vulnerability

A third set of questions asked institutional key informants their perception of how vulnerable Basin communities are and what variables they see as influencing community vulnerability.

More than half of participants stated that the Basin is less vulnerable than before 1997. Some were very optimistic – seeing 'tremendous improvement'. There were cautions, however, that decision makers may not have all the data needed to assess vulnerability in the long term - especially historical record data, and that in general the 'long term' is an unknown. With regard to Winnipeg, there were comments that the City is still highly vulnerable. The participant from the community advocacy group was somewhat more concerned about

disparity between Winnipeg and rural areas; namely, that the floodway expansion illustrates that the City is being flood-proofed to a higher standard than everyone else.

The issue of flood proofing of Basin structures to the level of the 1997 flood line plus 0.6 meters is seen as diminishing vulnerability. One participant noted that it is difficult for him to understand anyone not being flood proofed after 1997; that is, individual properties in particular. There was faith among some informants that the Province is committed to enforcing building regulations.

The above comments made by interviewees highlight several sets of variables that have heightened vulnerability concerns from the perspective of institutions in the Basin. Some concerns are centered on perceptions of human behavior in the face of the flood threat. One general comment by a rural municipal leader summed it up: 'Vulnerability will come from people's disregard of nature.' Another statement was 'people will get blasé ... (develop an) "it won't happen" here mentality.' Other comments also referred to apathy and complacency among citizens. One member of an NGO stated that experience (s) of flood may prevent complacency; this is consistent with the findings of Laska (1990) who concluded that prior experience contributes to the level of effort made to mitigate future floods. However, it is also obvious in comments made that there are forces that are seen by informants to increase vulnerability such as development pressures, and the provision of financial assistance to rebuild in a floodplain after a flood exactly as before the event. Also, past experience affects perception of risk less and less as time passes after a hazard event (Laska, 1990).

There were also observations by key informants that social relations in communities impact vulnerability - 'Social relations in a community can dictate what is done in an emergency-whose opinions are valued.' One interviewee recounted a story from 1997 to illustrate this. Just prior to the flood in one of the local communities, some enterprising younger adults within an at - risk community had anticipated a high level of flooding several days in advance of the water and had arranged to start some significant construction (mitigation) within the town. However, their beliefs about the high risk were countered by two powerful factions in the town, a group of elders with experiences of past floods and an elected local

leader. They did not take action - with severe consequences for the town. In this case, social relations impacted actions to alleviate vulnerability. In this instance, relying on those with experience (or past leadership) alone did not result in the best decision-making. This finding suggests the importance of understanding social relations in predicting a community's actions when a flood threat is imminent.

One activist interviewed made a comment about assumptions. His perspective as a grassroots advocate was that people put themselves at risk when they base their decisions on potentially inaccurate assumptions – such as that government compensation would be readily available - 'swift and generous'- if they should flood. Beatley (1999) in looking at American experiences during the Midwest floods in 1993 found that state and federal officials also felt that the anticipation that government would absorb costs to repair damages sustained by 'victims' was problematic and influenced residents' behaviors.

The issue of education and information as a source of or deterrent to vulnerability was interesting. Certainly some bureaucrats saw that people were more educated about flood-related matters, and in community interviews this perception was reinforced by the level of public outcry and demand for information related to the floodway expansion. However, members of NGO's and a grassroots organization believed that vulnerability results when there is a lack of available information or misleading information made available. 'Lack of or misleading information makes risk of personal damages higher' according to one participant. Education and participation of citizens do not fully ensure the quality of the information communicated to residents in relation to flood mitigation issues.

Other variables were also identified as contributing to vulnerability, particularly those related to science or issues related to financial resources. The first, most often touted by the bureaucrats, were limitations in the required sciences – such as problems associated with 'physical predictive measures' required in supporting mitigation decisions. Also, from the view of government agencies, budget constraints are seen to limit their ability to implement a wide range of solutions such as those emerging out of the IJC reports after 1997. Similarly, one NGO staff person noted that there is a need to 'look for the best alternative, not the

cheapest' yet the latter is more often the case. Another member of an NGO stated that government has traditionally largely ignored the problem of flooding until leaders are spurred to action when they realize they will ultimately save money through works such as the floodway expansion. It then has sufficient value to motivate action by senior government. There was also mention that government budget constraints may well be the reason for failures to implement some IJC recommendations on improving flood resiliency in the Basin.

In summary, comments about vulnerability by gatekeepers of organizations involved in flood management in the Basin indicate that there are a wide range of variables that are linked to vulnerability reduction. By far, however, responses to this question were dominated by social and political concerns more than technological ones, such as how people perceive risk and how political will, priorities, and resources change.

4.5.4 Ideal processes for decision making

In Question 4, gatekeepers were asked to consider what they believe would be the ideal process for making mitigation decisions, and if and how they plan to include community residents.

One informant from a prominent provincial agency noted that use of planning 'tools' and models to predict risk had their support as an ideal process. One municipal respondent thought the Clean Environment Commission (CEC) appointed by the Provincial government was an important part of a successful process for two key reasons: being 'high profile' and 'a formal organization apart from government.' A municipal respondent noted the importance of using tools such as caveats on properties outside of diked areas to convey a message to residents that 'you are paying a cost for the risk (if you live there).' A City bureaucrat thought that from an agency perspective the ideal process would involve the ability to determine and choose freely the best of all possible alternative courses of action. In reality, he claimed, that this is a 'luxury' not afforded decision-makers due to restraints such as lack of time. As a consequence he claimed 'society makes rough (unrefined) decisions' to handle flood threat. There was commentary about the need for the federal government to also adopt

a more vigorous role in vulnerability reduction. One person suggested they should make greater demands of provincial governments to address local vulnerabilities, and another stated that the federal government ought to create a national building code in a proactive approach to vulnerability reduction.

Once again the NGO's had a somewhat broader view of what would constitute an ideal process for making decisions to reduce vulnerability. Some of their suggestions included the following:

- Legislate one agency (rather than multiple) for enhancement and maintenance of flood protection.
- Assign an *ongoing* advisory body to advise government - a stakeholders group
- Develop an *ongoing* comprehensive plan which balances all activities at all stages of flood management
- Deal with a broader range of flood types (e.g., summer floods)
- Deal with a wider variety of responses to flood threat (e.g., nonstructural measures)
- Ensure when decisions are made that the consequences must be clearly stipulated to all stakeholders
- Have local disaster coordinators who know what to do, who are not fearful, and who understand local terrain

Most particularly they emphasized the need for 'ongoing' processes for mitigation decision-making and for more comprehensive planning.

Informants were also asked to consider how to best involve the public - if at all. The member of a grassroots organization made several comments about public involvement and namely the importance of open communication using multiple mechanisms (newsletters, town halls, etc.), and improved advertising of the venues used for meetings. There was an acknowledgement that this can be a cumbersome decision making process at times. He noted the importance of funding being made available when communities need to have resources at their own disposal to find the answers to (particularly) very technical questions. Another problem and challenge from his perspective was community residents not feeling

comfortable to challenge 'experts' in public venues and their questions therefore going unanswered. This can be considered simultaneously with a comment made by a local government leader who observed that 'technical decisions are hard for the public....people base decisions primarily on their own personal economics (such as will it raise my taxes?).' It may be worth considering that people who find it difficult and intimidating to have their questions heard and responded to might well disengage from involvement, unless they see immediate impacts to themselves or their families that must be addressed - such as a tax hike.

Other gatekeepers had various ideas about community involvement ranging from a comment 'not sure what role they would play' through to a comment that 'you have to involve them, given time'. Generally all thought in theory that involvement is preferable. Mechanisms for involvement suggested included: a series of meetings between elected officials and the public; use of formal groups like the Red River Basin Commission to bring people together; CEC type hearings; advisory bodies with stakeholders or resident advisory groups. As one person from an NGO outlined, there is need for several approaches to involving communities: formal processes (related to key documents for review), hearings, and information sessions and meetings. He also suggested that participation opportunities tend to lure the same few people all the time and the average citizen will only come if there is a direct effect (on them) and in a 'near time frame.' This is an issue in part of communication of risk to the local level. Another respondent noted that there actually needs to be 'public consultation on how to improve it' referring to community involvement. This is perhaps an astute observation.

It was also noted that municipal leadership is pivotal to community involvement and that their role should entail 1) understanding risk, 2) explaining risk (to residents), 3) asking residents their ideas on mitigating risk, and 4) holding community meetings.

4.5.5 Barriers to sustainable floodplain management

This question asked what the biggest barriers to floodplain management are and how the key informants would have them addressed.

'Society has trouble making decisions that affect people negatively' (City bureaucrat)

The key informant quoted above made a salient point that society – and specifically bureaucrats – do not like to say 'no' to people and to restrict their choices. One person stated that the respect that Canada as a country grants to individual freedoms and property rights also means that we cannot truly stop people from being in a floodplain; rather than saying 'no' we 'accommodate and problem solve.' The question arises as to whether the accommodations are in fact sustainable.

One of the most oft-mentioned challenges was lack of money for activities that would increase sustainability; one municipal informant linked this with 'unwillingness' and 'shortsightedness' of government and specifically the result of a lack of 'long-term funding and vision.' Time was definitely a key issue as informants cited the time interval between flood events and a continuing commitment by government as problems. One person from an NGO noted that engineers must often work within both financial and political constraints to find the best solutions to flooding that they can.

Another key challenge often mentioned was the lack of planning, and particularly the lack of a comprehensive plan and basin wide approach to water issues. Linked to this were comments about poor drainage management and lack of cooperation at municipal scales. It was observed by one NGO member that planning needs to happen at multiple scales including involving the public. Another respondent from an NGO noted that there is insufficient promotion of a broad Basin side approach and someone (an agency or department) needs to adopt that function.

Of all interviewees, one from a provincial agency had a different emphasis in what he perceived as barriers to sustainable floodplain management. His suggestions included that the barriers were: 'those who don't understand risk'; unrealistic expectations that people have that they can be protected no matter what the circumstances, and; people using their own personal criteria in decision making rather than 'risk oriented criteria'. He is suggesting that there is a socially constructed underestimation of risk.

As solutions to the barriers (or challenges) to sustainability, it was suggested that reorganization is needed which will pull together multiple agencies together into one arm of government. The desire for improved communication and expedited decision making were behind these suggestions. It was further suggested that more comprehensive, action-oriented plans need not only detailing but also to be 'sold' effectively to Members of Parliament and the provincial Premier, ministers at the highest level, and that someone or some organization needs to take on that role. Challenging government on their failure to institute a number of IJC recommendations was also seen as key to moving in sustainable directions. Two other suggestions to enhance sustainable practices included involving people at all levels and using more diverse activities to reduce flooding such as micro-storage of water on the landscape.

4.5.6 Determining institutional actions to reduce vulnerability

This question asked informants to describe how their agency or organization determines whether a plan of action in vulnerability reduction should be supported.

It was immediately obvious that cost-benefit analysis is the most commonly used tool when decision-making is formalized. However, informants from various institutions spoke of the limitations of the tool. One municipal leader noted that in his opinion it should be avoided at a municipal level; rather the message should be that you (as a leader) 'will do what you can.' He noted that cost-benefit assessments are not 'sensitive enough' to capture the nuances of the costs and benefits of a project. A member of an NGO similarly noted that cost-benefit analysis is not holistic; another claimed it has a place only if it is appropriate to the analysis and can include 'softer things'. A local activist took exception to the 'ad hoc' cost benefit analyses that he claims were used to determine that the floodway should be expanded to protect Winnipeg.

A bureaucrat noted that assessment of which mitigation action to take is also determined through 'engineering analysis of vulnerability' – with, however, elected officials making the final judgment. Another noted that cost-benefit is used by his agency particularly to influence

the scale of a project but that certain actions such as town dikes will be (and are) done regardless of the cost benefit ratio if it is 'at all feasible.' He described this as 'political decision-making' emerging from political motivations such as the desire to have the community risk simply resolved.

A rural municipal respondent described the process of decision-making from his perspective in some detail. The process was as follows: government consultants are used to provide needed information; local council considers political implications of a proposal, subject to the influence of local groups who may approach council with concerns; and finally consideration is given to impacts to all floodplain residents (outside local community).

4.5.7 Community priorities from an institutional perspective

The seventh question asked of key informants asked them to simply reflect on what they have come to identify as the chief priorities of Basin communities with whom they work. A second part asked how they have come to understand community priorities. The following is a summary of responses related to community priorities.

Community/community residents' priorities:

- Protect property
- 'Well-being of the community as defined through members of the community'
- Maintain tax base and attract new people
- Expect lots of direction (from authorities) but to make own choices in the end
- Expect government to be proactive and quick with funds
- Room for expansion within the (town) dike
- 'Stop thinking about flood …hope for the best'
- Access to work or livelihood during a flood
- Dikes for protection

One municipal leader noted that there is always the assumption that life will be protected - 'people…feel invulnerable.' It was also obvious that the priorities key informants identified can be organized around several themes. First, there was some perception that residents have considerable expectations of government, are concerned about viability of their communities whether through increased growth or population, and want their property protected. The activist also expressed some cynicism that many residents wish to ignore flood risk (when possible) although he explained as well that there are small groups of people who want to be involved in mitigation issues.

The second part of the question on community priorities asked informants how they came to understand community priorities. Three mentioned that they were sought out by community residents in their role within their institution or organization - particularly if they were elected officials. Some respondents noted that 'experience' with communities - typically over many years - was their best source of community knowledge. A rural official noted that his experience in 1997 taught him, for instance, that people 'would walk through fire to save their home.'

The informants' comments highlighted that personal knowledge was key to understanding communities, particularly time spent with community members in discussion; one NGO representative noted the importance of putting aside his own bias when listening to community members about their flood related issues. One bureaucrat indicated that his sources of information about community priorities came from reports, surveys and information presented by local elected officials- essentially second hand sources of information.

4.5.8 Insights on ethical dilemmas in flood hazard management

A question was asked about any ethical judgments faced by key informants in executing their respective jobs. Several spoke about challenges they faced in dealing with the public particularly. One bureaucrat noted that he put the facts before the public and 'wouldn't spin the facts.' Another said he felt compelled to provide truth and integrity and to get information

when it was requested of him. One provincial government employee said it was important to him to say he didn't know the answer to a question if, in fact, he did not. These were ethical pressures that institutional informants have had to respond to in executing their jobs. An NGO respondent has felt caught between government and local communities when he has had to decide what information he should or should not share with communities; at other times he has felt compelled to say 'negative things' about provincial government attitudes or practices although they provide funds to his organization.

One local municipal leader had somewhat different challenges and noted that he felt it 'unethical' when he was blamed in 1997 for emergency response actions that he was forced to take by the Canadian military. The representative of an NGO involved primarily in recovery from flood, said that 'questionable damage claims' by residents were an ethical dilemma for his organization in dealing with flooded residents. The informant from a local advocacy group has felt challenged to continue advocating for needs within the community when at times the community does not seem to prioritize the issues. However, he claimed to care about the 'greater good and sense of justice.'

4.5.9 Anticipated changes in mitigation decision-making

The first eight questions were created at the onset of the research. Once interviews began, however, a final question was asked of informants; namely they were asked to anticipate future changes in how mitigation is done and the future role of communities in mitigation.

Many changes were listed. One of the most anticipated changes related to people's expectations of government. One comment made by a bureaucrat was that the public is 'not prepared to let government do anything to them or for them.' Most particularly, several informants felt residents of at-risk communities expect their properties to be protected or to be paid high levels of compensation. The floodway expansion was also seen as a trigger for ensuring compensation arrangements are generous and pre-arranged. One person observed an increased dependency on government seems to exist.

In terms of decision-making it was noted by an NGO informant that action rather than caution seems to be emphasized since 1997. Also MEMO and WCIS are less 'hard-nosed' and are having political pressure applied to them to be more willing to 'listen to people'. Not surprisingly, another major change noted by various key informants was that more public involvement is likely, with government being seen as more sensitive to 'public opinion.'

There was reference to increased structural protections including the construction and flood-proofing guidelines (1997 plus 0.6 meters). One bureaucrat was anticipating better building bylaws and enforcement, and hoping to see development of a national building code to address flood threat. The activist felt that alternative mitigation measures (i.e., nonstructural) were still likely to be limited.

There was seen to be more general awareness of flood related issues and more related education. According to one rural municipal leader, municipal authorities too are now better 'educated, informed and proactive.' It is anticipated by some that legal advice and even litigation related to flood risk may become more commonplace, and that there will be less neighborly relations with Americans on this issue.

There was also some concern that many of the 28 key IJC recommendations on living with the flood risk (IJC, 2000b) will not be done, and that over time less substantive changes in human response to the flood threat will occur. Similarly, while there is hope for a broader basin wide and even multi-objective approach in planning, the ability to do it is not yet in place. The activist who was interviewed felt that a general change in the approach to flood vulnerability will, in fact, not occur unless the federal government applies pressure to the Province.

4.6 Discussion of institutional perspectives: documentary and interview findings

In order to identify the perspectives, priorities and values of institutions involved in floodplain and flood management in the Red River Basin, information from the documentary

analysis was combined with the results of interviews with institutional informants (gatekeepers). Here is a description of the key findings.

The interviews were in fact the best source of information on how decision-making actually occurs from the perspectives of institutions and organizations in the Basin. The interview schedule asked interviewees among other things to consider what is currently being done, how they evaluate alternative mitigation actions, and what the barriers to sustainable management are. This provided insights into their beliefs about decision-making and vulnerability. What was perhaps most noteworthy was the clear dichotomy in how bureaucrats view and approach the issue of flood vulnerability when compared with members of NGO's or community groups. Local municipal officials tended to have values similar to the NGO's although in some cases their perspectives did overlap with senior bureaucrats from provincial agencies or the City. The bureaucrats saw decisions related to mitigation to be 'event driven', being highly reactive to recent flood events. In addition, they seemed to view their formal mandate and legislative powers as the driver for their actions. Beyond legislative requirements they felt subject to highly fluctuating political forces and demands, and constrained by funding concerns. They also tended to view Provincial government agencies as the key decision-makers or the elected officials to whom the agencies answer.

Some informants from the various NGO's had a different perspective. Rather than seeing the decision-making process primarily as constrained and controlled by government priorities they saw it more as 'disjointed and disconnected', with current practices often serving the needs of the larger institutions who want to justify their own existences. They advocated a more inclusive approach to mitigation decisions (inclusive of stakeholders at many levels) and less layers of bureaucracy.

The perceived and actual dominance of several government bureaucracies in floodplain management and flood control also explained the ongoing preference for structural approaches to vulnerability reduction. Values in an organization are highly influenced by the education and training of it members and the dominant technologies utilized by the organization (Rokeach, 1979). In Manitoba, agencies such as WCIS (formerly Water

Resources Branch) and the City of Winnipeg (Waste and Water Branch) have engineers and technicians in many of their key positions, including high level administrative positions. This allows for leadership effectiveness within the agencies as there tends to be more consensuses within the organization (Rokeach, 1979). This also suggests, however, institutional change would be slow (Nash and Calonica, 1993). It is understandable that this 'engineering culture' can be linked to a propensity to focus on structural mitigation solutions, and a preference to see resources devoted to technological advancements like improved forecasting, water monitoring systems, etc. In essence, floods continue to be framed as technical or scientific problems and subjected to traditional scientific analyses by these institutions.

Such organizations also tend to prefer the clarity of a cost benefit analysis in decision making, a preference seen for many decades in the Basin. Similarly, 'engineering analyses' of vulnerability uses statistical analysis, calculations of physical measures such as water levels, soil composition, return periods, and employs tools such as topographical maps. Interestingly, however, even going back to the early construction of town dikes after the 1976 flood, apparently town dikes would be built even if the cost-benefit ratio was not favorable. The reason given by one bureaucrat was that it was perceived at the time that government had to take action to protect the communities in question. At times of intense political pressure to reduce vulnerability, political agendas take precedence over many other considerations in assessment of the problem.

Bureaucrats' responses to interview questions suggested that the political priorities to which their agencies must respond come about due to 1) public pressure applied to politicians by citizens to which politicians feel compelled to respond or 2) fiscal pressures felt by politicians when damage costs are too high. It was also clear that some of the pressure is transient, making long term planning for mitigation difficult as resources may be redirected when new priorities surface. This was a criticism suggested by NGOs and local representatives who noted that lack of vision, and short time frames in planning remain a problem.

However NGO's and local groups frame the problem of vulnerability reduction somewhat differently as was seen by comments about the need to adopt more integrated approaches to the problem of flooding and increase opportunities for communities, municipalities and government to work together in defining the problem and searching for solutions. There are currently such groups working collaboratively with multiple stakeholders (e.g., Red River Basin Commission; International Red River Board) who wish to collectively make decisions on flood- related matters. These organizations have values systems that prioritize collaboration and cooperation. While valuing the science contributions to vulnerability reduction, they also prioritize 'inclusiveness' of all stakeholders and seek to bring all interests to the table. They were well aware of the limitations of cost-benefit analyses and particularly how intangible flood impacts such as human loss and stress from flood events are difficult to include in a substantive way in decision-making.

Interviews and documentary evidence showed a lack of attention to aspects of vulnerability reduction that require 1) altering human perspectives or behavior (Blaikie et al., 1994) or; 2) investment of resources into working with communities to address their own vulnerabilities (Mileti, 1999). It was seen that many interviewees regardless of their respective organizations saw people's complacency and avoidance of flood issues as a significant barrier to reducing vulnerability. There were also several observations that people appear to often make decisions based on their personal goals or wants without consideration of flood risk or the impact of their actions on others – such as when City residents altered or removed secondary dikes so they might view the river. This is an interesting perspective in that it seems to assume that the public's actions may be primarily selfish and the result of either lack of motivation or even perhaps, faulty values. In fact, institutions are in part responsible for instilling within the public a sense of what is an appropriate response to a situation. In other words, institutions within society instill expectations of what is appropriate (Nash and Calonico, 1993). The public's failure is also an institution's failure.

Conversely, it was observed that the more you educate people the more they may in fact require of elected officials, agencies, or local leaders. Perhaps this issue creates some ambivalence within institutions in the Basin. Namely, there is recognition that awareness

combats complacency, but it also places demands on institutions to respond to new knowledge among citizens. Given some of the traditional operating values of some flood management institutions, such as top-down approaches and reliance on technical expertise, they may be significantly challenged by new directives to increase the level of public participation in decision making.

The review of documents and key informant interviews expanded understanding of the context in which mitigation decisions are made in the Red River Basin. Institutions and organizations that engage in flood related activities were seen to have some articulated beliefs about flood vulnerability, what role communities ought to have in mitigating flood damages, how flood vulnerability ought to be relieved, and what barriers exist to vulnerability reduction. While there was not always agreement among all participants on these issues, it did become clear that institutions themselves are struggling to fulfill their responsibilities while being constrained by multiple factors. They are well aware particularly that there are *conditions* that make identifying, developing and implementing ideal solutions difficult - too little time, too little money, a limited mandate (or no formal mandate), changing political motivations, lack of national vision, and inadequate evaluation and assessment tools (e.g., cost-benefit). There were also processes that were clearly deficient. Public involvement in decision-making was seen as desirable (for various reasons) yet the processes for doing it were not clear. For some institutions there appeared to be some ambivalence about the advisability of public involvement, and some cynicism that residents would not be able to recognize their level of risk or would not be interested in vulnerability discussions. Those who displayed such cynicism did not suggest that perhaps their organization ought to have a role to play in altering citizens' perceptions and behavior related to flood risk. This is in contradiction to institutional values research that claims that government institutions particularly have a responsibility to society to take leadership and uphold values that benefit society (in this case vulnerability reduction) (Rokeach, 1979). It also contradicts flood hazard research that also places responsibility for the creation and therefore amelioration of vulnerability with institutions that have a key formal mandate (Tobin and Montz, 1997). Finally, there was also a lack of clear process for how a broader vision for sustainable floodplain management could be achieved, particularly given the lack

of mechanisms for agencies and organizations to work cooperatively in long term planning i.e., organizational structure. There was little indication that there will be any restructuring of human and financial resources to accommodate the goal of sustainable floodplain management any time soon.

4.7 Governmental values and norms

Table 4.1 lists several important operational values and norms within only governmental institutions that were revealed in documentary analysis and key informant interviews. They have been singled out for discussion to highlight how they relate to vulnerability approaches. The reason for this is that governmental policy and action is a key variable in vulnerability reduction (Tobin and Montz, 1997; Mileti, 1999). The values/characteristics relate primarily to provincial and municipal government/agencies. In the second column it is noted whether the values/characteristics are *consistent*, *not consistent* or *in part consistent* with current thinking related to vulnerability to flood.

Institutions with decision making power in the Basin (as opposed to NGO's) were seen to have a somewhat narrow view of how vulnerability ought to be approached, in contradiction to the vulnerability approach to hazards (Jones and Shrubsole, 2001). The predisposition towards framing the problem of Basin vulnerability primarily through single-objective, single-solution approaches was evident through not only preferences for structural measures (discussed below), but also through a lack of cooperative frameworks which would allow the many stakeholders to bring their perspectives and knowledge to the table.

Table 4.2 – Governmental institutional values related to flood management

Governmental institutional characteristics / values in current decision making	Consistent with vulnerability reduction approaches? Yes (Y) No (N) In part (I)	Vulnerability Perspective
Narrow view/limited objectives	N	▪ Negates the complexity of creation of flood vulnerability, and need for multiple approaches
Structural solutions dominate	I	▪ Dominance of technical solutions negates social causes of vulnerability ▪ Does address physical vulnerability
Utilization of quantitative analyses	I	▪ Decision makers comfort with these analyses mean they may be over utilized
Limited public participation processes	N	▪ Limits use of local knowledge in planning ▪ Limits local commitment to vulnerability reduction ▪ Reduces local awareness of vulnerability issues
Inertia/ inflexibility	N	▪ Failure of dominant institutions to adapt to change is a contributor to vulnerability ▪ Limits their ability to provide effective leadership
Top down decision-making processes	N	▪ Government actions are defended by reference to mandate, narrowly interpreted ▪ Local communities are excluded from many decisions with local impact, undermining vulnerability reduction efforts
Provision of financial compensation to flooded residents	I	▪ Helps to balance inequities among stakeholders ▪ Discourages residents from taking responsibility for own actions (encourages government dependency)

More specifically, the institutional preferences for structural solutions to flooding are listed as consistent 'in part' with vulnerability approaches. These approaches, highly technical in nature, address biophysical vulnerability, that is, the vulnerability that is based on the characteristics of a hazard or initiating event; biophysical vulnerability is synonymous with physical exposure and dependent upon factors such as magnitude, duration, frequency, impact, rapidity of onset and proximity (Tierney et al., 2001, p.15). The use of structural solutions is one means of reducing vulnerability primarily through reducing flood

susceptibility at one place through altering water movement away from vulnerable areas. However, the problem with a 'preference' for these approaches is that they create a faulty illusion of invulnerability; they alter the relationship between humans and the environment (Burton, Kates and White, 1978), negating the social causes of vulnerability. They can result in highly inappropriate development of some floodplain areas, and often do not consider that structural measures can fail. The better approach is a mixture of structural and nonstructural approaches to flood (Pal, 2002) to address both the physical and social nature of vulnerability.

Similarly, the use of quantitative analyses seen in the Basin is of concern because of its overuse. This is commonly seen in flood hazard decision making where there is a failure to acknowledge the underlying assumptions that are part of various quantitative analyses (e.g. cost-benefit; engineering assessment) (Stefanovic, 2003), and the limitations in probabilistic predictions (Mileti, 1999) upon which decisions are often based.

The characteristics of institutional inertia and inflexibility suggested by this research are also not conducive to vulnerability reduction. These findings suggest that there is a significant amount of work to be done in engaging senior government officials in being more open to new vulnerability reduction approaches, including less emphasis on engineering solutions and less top down processes in working with communities to reduce vulnerability. Change is often difficult for institutions. For example, in the United States it took the severity of the impacts of the 1993 Midwest floods to change in part the attitude and role of government-particularly FEMA (the Federal Emergency Management Agency) - from an agency that relied on structural measures to one that embraced nonstructural remedies (Mileti, 1999). One of the unique characteristics of vulnerability approaches is the emphasis on decision making processes. They allow for criticism of, for example, bureaucratic values and processes which limit the range of causes and solutions considered in vulnerability reduction (adapted from Jones and Shrubsole, 2001). Also relevant in this study, the exclusion of communities in vulnerability assessment and amelioration at a local level undermines local ownership and capacity development to address hazards, which is also problematic (Pearce, 1997).

These limited public participation processes similarly mean that communities are primarily consulted through a limited range of public participation mechanisms at discrete intervals (as mandated) rather than on a regular basis. This limits creation of trust, enhances a notion that decisions are in essence made prior to public participation opportunities, and prevents local awareness of the creation of vulnerability over time.

The reference to authority-driven, top-down processes as characteristic of senior government institutions emerged through documents and interviews that revealed that government agencies were motivated largely by their mandate, within an environment where financial and other resources are clearly limited. Within some institutions there seemed a lack of understanding of a broader role for community consultations on mitigation. There was little discussion of the importance of community participation in vulnerability reduction which is an important tenet in vulnerability approaches (Tobin and Montz, 1997; Pearce, 1997).

The provision of financial compensation for flooded residents has been a pattern of government response to flood events for many decades. It is in part consistent with vulnerability approaches as it helps to balance inequities that may exist. A case in point is the provision of compensation if communities flood as a result of floodway operation. However, what is more concerning is the fostering of a sense of entitlement (Beatley, 1999) among citizens which precludes residents and communities looking for local sources of vulnerability and making local decisions to minimize risk.

In summary, the role of institutions - and particularly those with decision-making powers - is essential to vulnerability reduction of both physical sources and social sources of vulnerability. With regard to the latter, Tobin and Montz (1997) speak of the need for institutions to take leadership in changing the priorities, beliefs and values within society that are not conducive to reducing sources of vulnerability. They also call upon grass roots organizations – which do not appear greatly empowered in the Red River Basin – to become increasingly involved in community issues related to vulnerability. It is evident from this research that the changing of values and beliefs within society would require a markedly

different or expanded approach to flood issues within mandated institutions, the development of a much enhanced skill set with regard to community outreach and liaison, and better communication strategies. The idea of grass roots approaches to vulnerability would require local leadership to take the initiative with regard to assessing and ameliorating vulnerability, formal recognition and assistance to pre-existing local groups by decision-makers where possible, and development of new community based groups armed with appropriate resources (practical and technical) to address flood resilience concerns.

CHAPTER 5: SURVEY OF COMMUNITY PERSPECTIVES

5.1 Introduction to community research

The local community level is where many adjustments to hazards are made; not only are mitigation structures often at the local level, but more importantly, attempts to modify the human system most often happen at the community level (Tobin and Montz, 1997) where attitudes towards vulnerability reduction can be influenced. In this study, local community level vulnerability was viewed from the perspective of community residents' priorities, world view, and associated values and how they influence decisions on how to mitigate flood risk.

As described in Chapter 3, the assessment of community perspectives and values relevant to flood hazard vulnerability was conducted through two data collection activities in two Basin communities, Ste. Agathe and Emerson, Manitoba. The two major data collection activities are described in Chapters 5 and 6. The first phase, described in this chapter, involved conducting a semi-structured survey of forty-eight residents across two Basin communities at risk from Red River flooding. This initial phase in essence offered an overview of how two communities in the Basin live with and respond to the flood hazard. The survey began to explore residents' perceptions of their communities and specifically community values and priorities, and how the community copes with the ongoing potential for flood events through social processes that exist within the community. This information helped guide the second phase of data collection which was a more in-depth study of community vulnerability; this second phase was done through the application of a photography method in which a small group of residents from each of the two communities took photographs of their community to represent community values / attributes and objects/places/people of special relevance when they consider the flood risk. Individual interviews with participants followed the photography exercise and a focus group was conducted to review the results of the analysis. This data and analysis are presented in Chapter 6.

5.2 Community survey results

The purpose of Chapter 5 is to present the results of the community survey in relation to community values (priorities) and perspectives, their link to flood management issues and mitigation decisions that are made locally, and ultimately their link to vulnerability. The results of the survey are presented below, organized according to themes that emerged from the data. This is followed by a discussion and a reflection upon how the findings relate to the concept of flood vulnerability in the Basin.

The community survey was conducted as part of a Social Sciences and Humanities Research Council of Canada (SSHRC) Community – University Research Alliances (CURA) grant. The funded project was entitled 'Flood research partnership: promoting stakeholders' participation in sustainable floodplain management.'

5.2.1 Community attributes

People living within the communities of Ste. Agathe and Emerson readily identified certain attributes that tie them to their communities, and give them a sense of identity. For example, security was among the most important attributes respondents identified that they experienced in their communities. In fact, this value orientation was so strong it could be identified as a core value. Security was experienced through specific, and somewhat different, dynamics in each community. For residents of Ste. Agathe security was often focused upon a feeling of personal security that came from a sense of belonging and connectedness to others. Emerson residents also felt a sense of personal security through relations with others, and also through broader social factors such as a low crime rate and a strong police presence in town and at the nearby border.

Ste. Agathe data reflected the importance of social capital in ensuring a sense of security for residents. It was revealed that the community has a history of kinship ties and extensive social networks, with reciprocal loyalties, rights, and obligations. Service values (evident through high levels of volunteerism) were also seen as important in the town, and according to one respondent are reflective of the 'faith values of the French Catholic church', the

prominent longstanding religious institution. Residents reported relying upon certain aspects of social capital (and particularly social relations) such as social solidarity, communal support, and mutual trust in coping with times of crisis, such as flood. People from Ste. Agathe spoke highly of their community's ability to rally under stress, noting that there is generally a high level of cohesiveness, and conformity to actions that 'contribute to the welfare of the group'. This has been a valued norm. There is consequently a high level of motivation to behave cooperatively.

While data from respondents reflected a desire to maintain the well-being and quality of life enjoyed prior to the 1997 flood disaster, the flood and its aftermath has posed significant challenges to the community of Ste. Agathe. For example, it was suggested that events during and after the 1997 event may have diminished cohesiveness and cooperation by dividing people over issues such as compensation equity, or dividing those outside the town dike and those within it. Another flood would test and challenge community values.

In Emerson, security was also a vitally important value among this sample of residents. Security seemed most closely tied to the practicalities of a low crime rate and a high quality of protective and support services in the community (police, fire, ambulance, seniors' housing). Emerson evidence suggests strong faith in local authorities to deal with practical flood issues, and high levels of conformity to authorities, particularly among residents within the diked areas (which have not flooded in decades). Cooperation appears to be a publicly lauded value. As one resident stated "residents understand that council decisions regarding flood management are done for the public good".

In Emerson, recreational values also play a vital role in quality of life. The wide range of recreational activities, given the town's relative small size, helps define the community and also helps solidify social relationships. The town is heavily reliant upon high levels of volunteerism from across the community (all ages; all interests), and substantial cooperation is needed to maintain significant local recreational amenities such as a golf course, pool and arena. Values of volunteerism and cooperation (to achieve socially valued goals), embedded

as they are in the existing social arrangements, aid the town in a coordinated response to many challenges including floods.

Data from the interviews in both communities show distinct patterns in leadership that impact flood risk management. Within Ste. Agathe, it was revealed that key opinion leaders had authority to set many aspects of a community agenda. Many of these leaders belong to the Ste. Agathe Economic Development Committee (SAEDC), a local group of residents that guides discussions on local community development. Other members of the community not connected with the SAEDC had surprisingly few linkages beyond the community for information, especially related to floodplain management issues. Researchers were told that the SAEDC addresses most community issues, including flood planning, at a local level. Interviews revealed that overall participation by the general public in floodplain management or mitigation decision-making is low. In addition, there was uncertainty about whether or not any local group has a mandate related to local flood management issues. When asked, over two thirds of Ste. Agathe respondents thought no local group has a mandate to deal with flood issues. Most of the other one third of respondents who thought a group had a mandate stated the group was the SAEDC. In fact, the SAEDC does not have a formal flood-related role in the community. No local group does. However, at the time of the 1997 flood the SAEDC did take a very prominent and proactive leadership role, coordinating volunteers and services during and after the flood. This precedent, in fact, may explain the confusion among community members with regard to whether or not the SAEDC has a formal role to handle flood related issues within the community. Clarification of roles and responsibilities is warranted to improve local decision-making.

The town of Emerson respondents, in contrast, reported that no single community group assumes general leadership in the community. Elected officials and a range of formal services personnel (e.g., volunteer fire department) are seen as leaders in dealing with flood issues within the realm of their formal responsibilities. Like Ste. Agathe, though, the general public is rarely involved in decision making. Three quarters of respondents who answered a question regarding public involvement claimed to have had no involvement whatsoever in

local floodplain management. Leadership in other areas of community life (culture; recreation) was, however, quite diverse in Emerson.

In both communities the data suggested high levels of reliance on local leaders, conformity with the decisions that they make, and little mention of individual community members having a personal role – or perhaps, more importantly, believing that they have a role to play – in how decisions to reduce flood vulnerability are made within the community. The level of disengagement from flood-related decisions in Ste. Agathe and Emerson, in contrast to high levels of volunteerism in other areas of community life, suggests that there are barriers to involvement that need to be better understood.

5.2.2 Community economic development and flood vulnerability

Values related to growth and economic development were particularly evident in Ste. Agathe interviews. Data from participants suggested that the value placed on development might come in part from the assumption that development is the best means of ensuring the viability of a well-loved community. For example, thirty percent of Ste. Agathe respondents were concerned about the town dying as a result of the existing flood threat; an extension of this concern was the potential negative impact of the perceived flood risk on new businesses that are considering investing in the town. The SAEDC in Ste. Agathe has clearly articulated economic development goals and there appears to be social investment in these values. Respondents referred repeatedly to the importance of this committee and its members in setting a town vision for growth and development. What appeared lacking was a community-wide process for including all segments of the community (including other community groups and organizations) in promoting land-use planning and intentional actions to reduce multiple sources of community vulnerability. In addition, researchers were told that the SAEDC had absorbed a couple of other community groups raising a question of whether the loss of other distinct groups may or may not have diminished the capacity of other interests within the community to be captured in community decision-making.

The data from Emerson are somewhat different than Ste. Agathe with regard to the importance of development values. While similar to Ste. Agathe in ongoing concerns about community viability, respondents appeared more content with the status quo with regard to community growth. There was little emphasis on investment of resources into promoting growth, nor reference to a key organization actively spearheading development, although there was clearly a desire for sufficient growth in business and jobs so that young people will stay in the community. The number of elderly and semi-retired persons may perhaps account for this difference in attitude between the two towns (i.e., between a greater and lesser focus on community growth). Similar to Ste. Agathe respondents, almost 25% (as compared to 30%) of respondents noted that a key concern they have with regard to the ongoing flood threat is that it may reduce the number of people interested in moving to the community or that people may leave.

5.2.3 Technical and nonstructural approaches

Among residents who were interviewed in both communities, perceptions of what constitutes flood 'mitigation' were sharply focused upon alteration of physical processes (through dike construction particularly) in the floodplain. Participants from both communities showed a distinct preference for technological solutions to the problem of flood vulnerability. These technological 'solutions' are structural mitigation measures, namely tangible structures that alter the movement of water across the landscape (e.g., dams, dikes, levees, floodway channels). People in both communities who were interviewed most often perceived their town dikes as key to relieving their feelings of vulnerability, with over half of Emerson respondents and 40% of Ste. Agathe residents noting that the town dikes make them feel less vulnerable. Many were also aware of the very large structural projects proposed to protect the city of Winnipeg.

The residents in both communities were in fact asked two separate questions to investigate beliefs related to vulnerability reduction. They were asked about actual local mitigation activities, and to also identify actions or items that currently reduce their sense of vulnerability. In both communities there were few references to nonstructural means of

mitigating the impacts of a flood or reducing susceptibility to damage. For example, very few respondents made mention of development and redevelopment policies, restoration of riverine environments, building codes, flood forecasting capabilities, warning systems, information and education, recovery programs, or floodplain zoning and regulation.

When Ste. Agathe residents were asked about their town dike, it was also striking that they were not accurate in their assumptions (in fact, were highly inaccurate) about the level of its completion at the time of interviews, given that only five years had passed since a flood devastated the town. Nor were respondents generally aware of the cause of the delay in its construction. The results suggest that many people are comfortable with making assumptions about their safety without confident knowledge of the facts surrounding that safety.

5.2.3.1 Emergency response plans

Since the 1997 flood, development of local community emergency response plans has been a key nonstructural governmental response to flood vulnerability in the Manitoba portion of the Red River Basin. Typically, local emergency response plans are intended to address local concerns, vulnerabilities, and local knowledge of the physical landscape in planning for floods. Yet during interviews, many respondents were not familiar with their local plans. For example, when residents in Emerson were asked about an emergency plan, one third did not know if one existed while just over a third were aware only that one existed but knew no details of the plan. In Ste. Agathe people were somewhat more informed with around 20% stating they had a high level of understanding of the plan details. However even in Ste. Agathe, almost one third of respondents said they were not aware of a plan. One person in Emerson who described themselves as 'slightly familiar' with the plan said "sirens and some notification will happen" by way of a description of the plan. Interestingly, the siren they referred to is in fact across the border in the United States and not in their community at all.

In Emerson, the competence of the local emergency response team was an important variable that diminished feelings of vulnerability among respondents. Most residents were content to

leave flood response and mitigation to such authorities. One person noted that local flood fighting capacities lie with these individuals and that their experience and knowledge may be lost to the community over time (through retirement etc.). Yet there is no mechanism for dealing with such inevitable changes within the community; in essence a form of 'emergency response continuity' has yet to be provided for in community planning.

5.2.4 Civic engagement

The survey results suggested that individual residents in these communities are not seeking the type of voice in floodplain management that is lauded in the natural hazard literature (Pearce, 2001; Hewitt, 1997). By way of example, as noted earlier, a select group of community members in the town of Ste. Agathe (members of the SAEDC) appears to engage in decision-making on behalf of other residents. While the cohesiveness of the community of Ste. Agathe and the high level of kinship among residents may facilitate the assumption of decision-making power by the SAEDC, this social dynamic has its potential down-side. Those who are not linked to the committee members (and such residents existed among the sample) may potentially be at deficits in terms of attaining information and influencing decision-making processes. At least one interviewee felt that the SAEDC, in spite of its commitment to the community, was somewhat exclusionary.

In Emerson, residents leave decision-making almost exclusively to town council and other formal organizations such as the volunteer fire service or town council. The past success of the community and its leadership in preventing flooding within the community likely reinforces the belief that involvement is not necessary.

The civic disengagement from floodplain issues can also be understood in the context of information flow into the community. When residents in Emerson, for example, were asked how they receive information on floodplain issues, it became apparent that little concrete information reaches the average citizen. Informal networks for information (such as the coffee shops or stores) were popular but not necessarily considered reliable sources of

information. Participants from both communities also described limited information networks outside the community for gaining access to information on flood related topics.

When asked about formal public meetings to address flood issues, many people sampled in either community were uncertain if there had been public meetings on local flood mitigation issues or stated they did not attend any public meetings that did occur. This question was designed to find out what meetings/consultations they may have been aware of or had attended and was not specific to any one type of meeting (e.g., International Joint Commission hearings after the 1997 flood). Seventy-three percent of respondents from Emerson said that they were not aware of any local consultations. In Ste. Agathe roughly half of respondents were aware there had been some consultations although only 25% of respondents had attended any meetings whatsoever. Yet following the 1997 flood there were two consultations by the municipal and provincial governments in Ste. Agathe specifically to discuss three potential town dike construction scenarios and their respective costs. The meetings were advertised locally through mail-outs to residents and posted notices. Two questions immediately arise for further investigation in evaluating the effectiveness of such participation initiatives: why are residents' recollections of such meetings so poor and why did many choose not to attend at all?

One survey respondent also had this to say about attending consultations: "flood mitigation activities are provincially and federally funded so they (the province) just go ahead with implementation ...no consultation". This comment, reflecting a belief that mitigation is essentially a provincial and federal decision, offers insight into the reason that attendance and participation (often two distinct activities) may not be a priority for some residents. This theme, related to criticism that the final decision is a foregone conclusion prior to any public consultation, was also a theme identified by residents (of various communities) at public consultations in the Basin in 2002 related to proposals for large structural measures to address Winnipeg's flood vulnerability (Sinclair et al., 2003). Some respondents felt one option, i.e., to expand the Winnipeg floodway, had already been decided upon.

5.2.5 Flood legacy

It is impossible to discuss community values within the context of floodplain management, without a brief consideration of recent flood experiences. Those experiences, and local interpretations of them, have permitted existing values to be propagated, or offer potential to challenge current values. The 1997 flood experience provides one example of such a challenge. In Ste. Agathe it was suggested during interviews that there are unresolved issues that have arisen since the inundation in 1997. One issue is the perception that some residents received better compensation than others, meaning that flood damage pay-outs were not equitably distributed. The other issue is concern that those within the town dike and those outside are no longer as cohesive as before as a result of resentments created during the 1997 flood. These experiences and perceptions could interfere with the hitherto prevailing set of values in the community; namely, values such as mutuality, cohesiveness, and cooperation.

In Emerson, the flood legacy is very different and has likely encouraged certain community-level values. The town has successfully fended off flood waters through a combination of measures including the town dike, the concerted actions of local authorities, and external resources. This has supported the common belief that emerged during interviews that a strong combination of structural measures and able leadership are sufficient to address flood vulnerability without further demands on the citizens.

5.2.6 Individual rights and the public good

In the management of any hazard, there is tension between the balancing of both individual rights and freedoms with that of the public - the 'common good' (i.e. the needs of the community as a whole). For authorities mandated to deal with emergencies, public safety values are given high priority and often these compete with individual values and concerns. Respondents from both communities in this study noted the importance of protecting the public good during a flood crisis.

Emerson residents discussed protection of the public good in the context of emergency response. In keeping with their general attitudes of dependence, compliance, and trust in local authorities, they were very inclined to promote putting public safety over private rights

(or property) particularly when a flood crisis is occurring. Given that individual properties within the town have not flooded in recent history a wider acceptance of, for example, mandatory evacuation orders, is understandable.

In Ste. Agathe discussions of the importance of the public good came out of descriptions of the strengths of their community in coping with floods (their capacity to work collaboratively in a flood crisis particularly) and not in reference to emergency response. Their experiences with evacuation orders in 1997 were more contentious (Haque, 2000; Morris-Oswald, 2001). Researchers were also told of an interesting development related to notions of private and public good during the flood. It was reported that in 1997 residents from outside the town boundaries were asked to assist in sandbagging within the town, and ceased their own flood preparations. Concern now exists that there is lingering resentment over this, and in future people outside the town dike and those within it may no longer work as cooperatively. Verification of this story has proven difficult as the time of the flood was so chaotic; researchers were told it was not part of any approved action by the municipal council. Yet the recounting of these events depicts a community that is struggling with the issue of varying degrees of vulnerability among the local population; this will be even more pronounced in future floods with the new town dike. Whether this will divide a previously highly cohesive town remains to be seen; however, the events in 1997 showed there is reason to improve community dialogue about such dilemmas through planning a priori for a flood emergency and detailing the roles of community residents. While not all interests, rights or values can always be satisfied simultaneously, such as the right to safety, private property rights, personal freedom, and social equity, good planning anticipates these values dilemmas.

5.2.7 Shared values

Due to a slight change in the survey instrument, residents of Emerson were asked directly if they thought it important that community members share common values, and if so, how important. Most respondents (82%) of those answering the question thought shared values were important. As one community leader stated: "people feel more at ease when they have the same values....sharing core values means people feel less threatened and confident [that] decisions made will benefit them [when they hold the same values as the decision-maker]".

The values question also prompted additional comments by residents about the importance of cooperation during a flood. As one respondent noted, cooperation is needed "regardless of other personally held (individual) values the rest of the time". Some respondents also expressed an aversion to risky behavior during a flood by suggesting that cooperation with evacuation orders is in an individual's own best interest. In a flood emergency, there seemed little tolerance for individual rights superseding the broader notion of the public good when decisions are made in this diked community.

5.3 Survey findings and vulnerability

This research highlighted how values, beliefs, and associated behaviors of residents in two Manitoba communities have shaped a variety of responses to flood related issues - such as who is involved in local flood mitigation decisions, what flood mitigation measures generally receive local support, beliefs about who should be held responsible and accountable for flood damages, and attitudes towards development. The data analysis revealed that some identifiable community perspectives exist that require attention in efforts to achieve more sustainable floodplain management. The consequences were most profound with regard to public involvement in decision-making, expectations of government institutions, and preference for structural protection measures; these all have implications for vulnerability attenuation or alleviation. The following discussion highlights the relationship between survey results and vulnerability approaches to hazards.

Public participation in vulnerability reduction

The findings from both Ste. Agathe and Emerson suggest that overall support for public participation in flood-related decision making is low. Yet the importance of effective public involvement, and the inclusion of a wide range of stakeholders' perspectives is recognized as important to improving decision outcomes in this context (Haque, Kloba, Morton, and Quinn, 2003; Sinclair et al., 2003). Very limited public involvement from a vulnerability perspective compromises vulnerability reduction, in part because vulnerability reduction is dependent upon the fostering of local competencies (Yodmani, 2001); this is difficult to

accomplish when local people are not engaged in evaluating their own capacities and vulnerabilities. It is also important to note that both communities in this research showed evidence of high stores of social capital, as seen in high levels of cooperative behavior, mutuality, volunteerism etc. In Ste. Agathe particularly, the community was also able to rally considerable social resources to deal with the devastation of the 1997 flood. These are significant capacities that should be included in planning for the future.

Decision-making processes are compromised with a lack of local evaluation of vulnerability. Local experiences and local interpretations of hazard-related events contribute markedly to understanding vulnerability at the local level (Blaikie et al., 1994). At the local level, it is also important to understand the constraints and choices that people have, often related to livelihoods and social arrangements, as these also influence vulnerability (Blaikie et al., 1994). For this understanding to occur requires a local forum for discussing flood-related issues. Overall, and consistent with the findings here, other research in the Basin has suggested that better public participation processes would likely improve the quality of flood-related decisions in the Basin (Haque et al., 2003; Sinclair et al., 2003).

This lack of commitment of local resources to assess local vulnerability to flooding is also far removed from the ideal approach to addressing disasters, which is to look even beyond agent-specific vulnerability to general vulnerabilities to multiple hazards (Pearce, 1997; Jones and Shrubsole, 2001). It is clear from this research that there is much work to be done in preparing Basin communities to take responsibility for addressing vulnerability to hazards.

This study has shown little evidence that, at a community level, citizen values and beliefs that are not sustainable within a floodplain have been challenged- due to a lack of public process and forum at the local level, and lack of community-wide self-critique of flood management practices prior to 1997. Such self-critique might include how community actions and planning (e.g., land use; dike placement) have increased community vulnerability to floods. Blaikie et al. (1994) speak of the importance of understanding the evolution of vulnerability over time, based upon post-event reflection and intentional reduction of practices that have contributed to vulnerability. This was not in evidence in the survey of

residents; the sample of residents in this study had little awareness of local discussion or public meetings related to flood matters and, of those who were aware of meetings after the flood 1997, they often did not participate.

While self-critique may have been lacking, there was certainly some criticism of government in the aftermath of the 1997 flood (IJC, 1997; Manitoba Water Commission, 1999; Morris-Oswald, 2001). This assignment of blame to government for some of the negative outcomes of a hazard , or the expectation that government is obligated to offer damage compensation is a common feature in the aftermath of a natural hazard event (Beatley, 1999).This is likely linked in part to the types of social protections offered in Canada, and typical of many developed nations; social protections permit a type of 'voluntary vulnerability' (Rodrigue, 1993) where people elect to live in more hazardous zones partly as a result of the knowledge that they will receive some assistance to rebuild should they suffer damages. This has the potential to increase vulnerability. More specifically, when government compensates communities and residents that are flooded (i.e., through disaster assistance typically) and restores their homes and properties exactly as before, it does not encourage individuals or communities to be more selective about what activities are done on a landscape that is prone to periodic flooding. Compensation in fact discourages mitigation at an individual level and even at the collective community level when everyone is restored to pre-flood circumstances. This is the case in Manitoba, where people often build after a flood exactly as before, without applying new learning from the flood experience, or altering their decisions in the floodplain. Hence, they remain vulnerable to future floods. Vulnerability approaches to a hazard are based upon the notion that people will adapt their behaviors when they acquire new hazard experiences and knowledge; it means that there ought to be a change in social norms as necessary to create safer communities (Tobin and Montz, 1997).

Community results showed evidence of social norms (and associated values and beliefs) for responding to community flood related problems that reinforce non-participatory behavior in floodplain management decisions. In particular, identified community values such as dependency, conformity, complacency, and compliance increase the likelihood of community residents allowing others (internal and external to the community) to assume responsibility

for flood-related issues. This, in combination with an acceptance of somewhat paternalistic relations with government authorities (and their agencies) means that local interest in both vulnerability reduction and sustainable development within the floodplain is reduced. Such values set up pre-disaster social conditions that leave individuals estranged from local risk management decisions, and accepting of such disengagement. According to findings of this study, this estrangement is further in evidence through the lack of involvement of community members in the gathering and evaluation of pertinent information related to local risk assessment, potential mitigation measures, and formulation of local emergency plans.

Dependency upon government authorities particularly should be discouraged because independence and self-reliance are important characteristics of resilient communities, and vulnerability is associated with a lack of resilience (Jones and Shrubsole, 2001). Hierarchical power structures appeared to exist in both communities studied and are consistent with values of dependency and compliance with authority. However, it is important to observe that, in 1997, top-down institutional responses to emergency management generated distrust and suspicion in communities with regard to government decision-making (Haque et al., 2003). This is not unexpected perhaps given the 'historic declines in social trust in those responsible for protecting public safety' - the cause of which is thought to be, at least in part, the result of poor public involvement processes (Kasperson, 2005, p.95). Similar suspicion was evident in 2002 when a public involvement initiative related to selecting a flood protection option for Winnipeg prompted some residents to note that they thought the decision was already made before their views were sought (Sinclair et al., 2003). This suggests that residents' seeming acceptance of decision-making by government may in part be a result of inadequate means and knowledge of how to challenge authority and fully participate in decision-making – in other words ineffective public participation processes – rather than values such as dependency, complacency, or apathy. Suspicion and distrust may well increase the likelihood that community stakeholders will prefer to have their interests represented by others within their community rather than participate themselves.

Also, residents that were interviewed indicated that they had very limited networks with other communities coping with similar flood-related issues, thereby limiting the opportunities

for mutual support and effective regional mitigation planning. The need for broader plans and goals, and not just a series of local projects (Jones and Shrubsole, 2001) is an essential component of addressing vulnerability through sustainable hazards mitigation. Also, the intent of sustainable practices is to increase resiliency beyond single communities, and to avoid burdening future generations with unnecessary hazards (Mileti, 1999). The survey findings suggested that community responses to flood risk, and local decision-making in the Red River Basin, are not yet consistent with sustainable mitigation goals.

From a vulnerability perspective, vulnerability needs to be addressed through altering the command and control approaches that characterize much of the flood management in the Red River Basin. It should be replaced with management and planning that better utilizes community knowledge and capacities (Tobin and Montz, 1997; Petterson, 1999; Pearce, 2001). An ultimate goal is for communities to develop a sense of commitment and ownership (Mileti, 1999) for their own vulnerability reduction.

Structural Measures

A values stance deeply embedded in past responses to hazards in Canada and elsewhere, and in evidence in this study, was a distinct preference for technological solutions to vulnerability (Hewitt, 1997; Fordham, 2000; Tierney et al., 2001). During interviews in the two communities, this fact was made more salient when it was recognized that structural measures (and particularly dikes) were by in large the only measures that community members made reference to when questioned about 'mitigation'.

Community members also took great comfort in structural measures. It was shown in this study that some residents see the viability of their community as tied in large part to their town dike being effective, and to outsiders believing it is effective (and investing in the town). The town dikes are then powerful symbols around which people place their hopes for a secure future, a hope reinforced by the current political climate that preferentially applies engineering solutions to the problem of flooding. The tangible nature of dikes, being visible and measurable, likely facilitates such symbolism. Yet this dominance of structural measures to address hazards has been criticized (Hewitt, 1997; Fordham, 2000; Tierney et al., 2001)

and is not consistent with conceptions of vulnerability reduction. Such measures tend to reduce vulnerability in the short term only, as they do not last indefinitely, or may fail - often with catastrophic results. Furthermore, the emphasis on structural measures seen in the Basin permits people within communities to view the problem of flooding as one that is under the purview of authorities and engineers, thus abdicating local responsibility for changing community decisions and actions in the floodplain.

It was also evident in Ste. Agathe that some community members were concerned about the town dike being incomplete; many residents also were uncertain about its level of completion. The latter appeared startling given events in 1997. It speaks to a low level of proactivity among residents to have their uncertainties about mitigation measures addressed. This avoidance behavior is not consistent with creating more resilience within communities.

Nonstructural measures, in contrast to structural ones, seek to identify parts of the social system that need attention if vulnerability is to be reduced - such as through changing human perceptions or behaviors (Hewitt, 1997; Mileti, 1999; Pal, 2002). Many of these measures are also proactive, in contrast to policies which foster dependency on government through excessive use of structural approaches. The advantage of nonstructural measures (e.g., floodplain management policies; warning systems; education; forecasting capabilities; zoning bylaws) as opposed to structural ones is that they greatly expand the range of resources and options available for adjusting human practices on the floodplain. Their success is often at least in part linked to dialogue about how to best balance community and social priorities, education of citizens, and deeper understandings of residents' assumptions and perceptions in high risk zones. An integration of the two - both structural and nonstructural measures (Pal, 2002) appropriate to the local level but also within a wider regional planning context - is considered a preferred approach to vulnerability reduction.

Unfortunately, while nonstructural measures such as floodplain management policies are seen as an effective means of reducing flood damages (Shrubsole, Hammond, Kreutzwiser and Woodley, 1997; Shrubsole, 2001; Pal, 2002), they offer little in the way of tangible assurance of security to residents. Efforts must be made at both the federal and provincial

government to take leadership on this issue through investment of time and resources in applying and promoting the use of a range of nonstructural measures in vulnerability reduction throughout the Basin. Government also has a role to provide practical and technical support as needed to help improve local level decision-making to address vulnerability (Petterson, 1999).

Development values

Like structural measures to reduce vulnerability, development values among community residents in this study were linked to the belief that development helps to ensure community viability. This is particularly important given that both communities have had a population decline since 1996. In Ste. Agathe residents have attributed it in part to the impact of the flood of 1997; in Emerson, more to other factors such as loss of job opportunities for youth. For high levels of support for development to be seen, it is likely there are enabling assumptions that facilitate such development values in a floodplain. Based on past history in the Manitoba context, these assumptions may well include beliefs that provincial and municipal governments will assume responsibility for regulating or restricting the use of land as necessary, or that in the event of a flood, communities will be assisted to rebuild largely as before, or that a return period of one in one hundred years means another large-scale flood will not put the community (and any new development) at risk again for decades.

The residents within these communities appear to believe that their town dikes offer a high level of protection and the benefits of development outweigh the increased risk of new development. The decision to expand development is thus a 'rational' one from the perspective of local residents. What is critical to decision-making in high risk zones is the veracity of such key assumptions and whether any trade-offs between values (such as between economic growth and security) are explicitly discussed and evaluated at a community level, and in the context of other community goals and priorities (Petterson, 1999). The evidence from these communities suggests not. Again, government policies and practices related to vulnerability reduction are crucial to changing perspectives in a floodplain. To impact entrenched values and beliefs, and prompt change, they must be

prominent in the public eye, relevant at the local level and sustained over the long-term - regardless of other issues to hit the political agenda.

Differential vulnerability

It should be noted that within Ste. Agathe an issue was raised about the fact that some community members are more vulnerable than others due to the construction of the town dike since 1997. These residents are more vulnerable due to the location of their homes outside the new dike, when compared to residents within the dike (increasing exposure). It was expressed in the survey responses that there is concern that this differing level of vulnerability might interfere with community cohesiveness, a source of social capital. The erosion of social capital has been identified as a root cause of disasters (Mileti, 1999) because it enhances vulnerability. However, like many issues related to vulnerability, this one ought to be addressed in local level planning for flood events; addressing such issues is fundamental to vulnerability assessment. While not all people can necessarily be protected equally, good planning should assist in ensuring the most vulnerable receive as many protections as possible in the event of a flood.

CHAPTER 6: CAPTURING COMMUNITY FLOOD VULNERABILITY THROUGH PHOTOGRAPHY

6.1 Introduction

Superficial vulnerability is more widely understood than actual underlying processes that may contribute to communities becoming unsafe (Jones and Shrubsole, 2001). This research set out to explore the underlying processes that are housed in social, political and economic characteristics of Basin society. From the outset, it was deemed important to try to capture community values and perceptions of vulnerability through in-depth methods that would allow for residents to truly spend time in reflecting upon the issue of flood hazard in the context of what the flood risk 'means' to them and their community - what it most threatens, how residents view their vulnerability, and the best means for addressing it. The visual methodology employing photographs generated by residents was an unusual and intriguing method for engaging people in examining their landscape and what is important to them. Participants responded by taking considerable time, care, and thought to represent and explain the 'character' of their flood-prone communities from their perspectives.

The following sections discuss the analysis of community characteristics, perspectives and values that emerged through review of community photographs and the answers to questions that were posed during interviews with residents. First the central themes that emerged through the analysis of photos, interviews and focus group data are presented under several descriptive headings; the themes highlight issues that were discussed by residents in reflecting upon the vulnerability of their communities to flood. In some instances there are representative samples of photos and comments made by members of the community that relate to the subject heading. The results from the town of Ste. Agathe are discussed first, followed by findings from Emerson. These findings are followed by a Discussion section called 'Living with the Risk' that explores community sense of flood vulnerability, as revealed through the photographs, associated interviews and focus groups. Finally, comments regarding the use of photography as a method for exploring community values, perspectives on a flood hazard, and community vulnerability are presented.

6.2 Ste. Agathe, Manitoba

6.2.1 Community attachment and history

Residents identified greatly with the history of Ste. Agathe and the surrounding rural region. Some of them discussed history related to the Red River with photos of, for example, the monument in the center of town which is a mounted boiler from an old boat (Figure 6.1) – the 'Cheyenne' – which is the 'town logo.' The town created the monument to reflect their history. People recounted how the boat sank in the Red River off of Ste. Agathe in 1885, and in 1981 the boat was found by accident during an operation to dredge the river. The boat was built in the 1870's in Grand Forks.

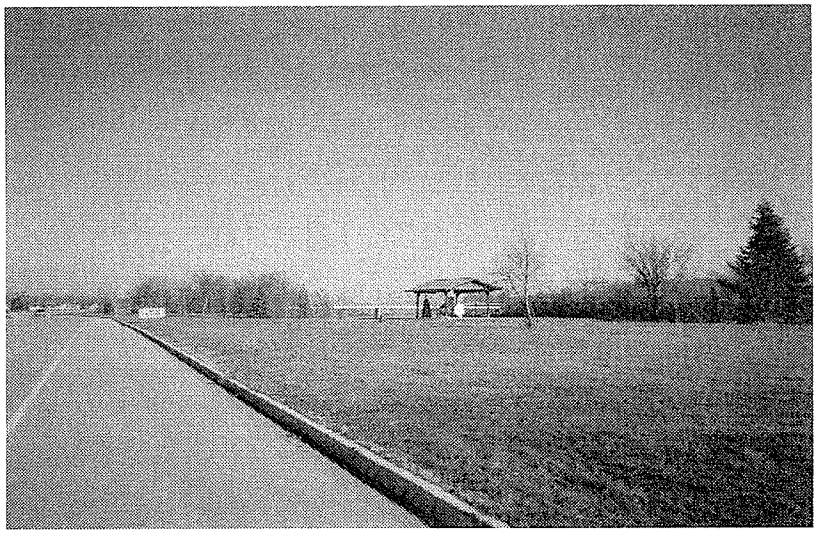

Figure 6.1 – Historic boiler monument

One participant in the research also took photos of extended family children, and their friends, which she referred to as the 'explorers' (Refer to Figure 6.2). The children have fun excavating areas along the river; in a tree house they have a stash of located river 'artifacts' such as bottles, a beaded purse, etc. It is a pastime for children and they are enthralled by their finds which they assume have come from sunken boats or other debris floating in the river. During group discussions it was noted that local boys and girls have a great deal of respect for the river, having grown up near it. Parents explained that they have more difficulty guarding the safety of youth who are visiting the community who, due to lack of experience, do not respect the river hazard.

Figure 6.2 – Children on the bank of the Red River

Figure 6.3 – Anvil monument

One resident, reviewing a photo of her own home, explained that part of it was constructed from wood originally from the sacristy of the first church in town which dated around 1873. Another person's tie to local history was depicted in a photo of the other town monument in the center of town, an anvil (Figure 6.3). It originally belonged to his wife's uncle, and is a heritage monument. Her family was among the original founders of the town and came from France; her uncle was the local blacksmith. This monument, the participant noted, had water up to the base of the anvil in 1997.

The participant also took a photo of his wife's parents' home which is one of the oldest still intact in Ste. Agathe, dating to circa 1890 (Refer to Figure 6.4). The 'home represents endurance' to

the participant who photographed it, having survived numerous floods and particularly the devastation of 1997. Her elderly parents still live in Ste. Agathe. Many participants in the study articulated their attachment to the town through photos of old childhood homes or those of other family members.

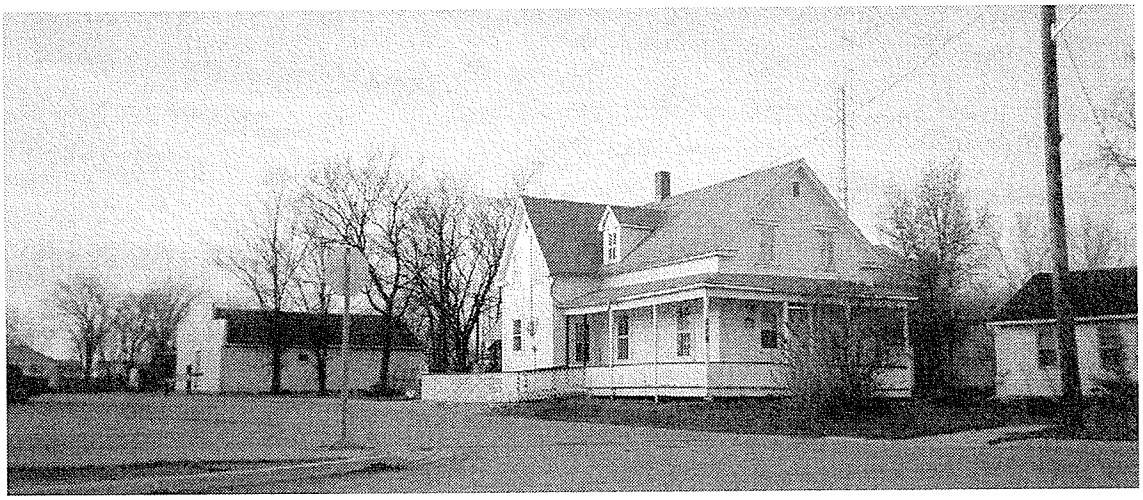

Figure 6.4 – Multi-generational family home

There were also photos of individuals taken by participants. In one case it was of a spouse whom the participant described as his 'partner in recovery (from the 1997 flood)', noting the mutual support that brought both of them through the difficult events during the flood and in the aftermath (during recovery and reconstruction). He noted their good fortune however, by saying that 'we had youth, and energy, and contacts enough that rebuilding was not as difficult (for us) as it was for some other people.' Nevertheless, he claimed, 'it was a rough go.' Another photo of a local individual was taken of someone within the community who took on a leadership role, helping to organize the community response to the flood in 1997. He is seen as a prominent leader in Ste. Agathe.

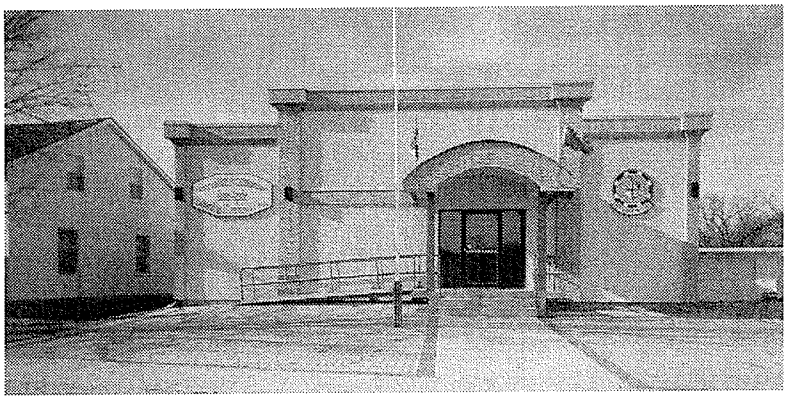

Figure 6.5 – Community Center

There were symbols of the closeness of the community

especially during a time of crisis. A photo of the Community Center (Figure 6.5) was described by one person as the 'heart of the community' as he reflected on how in 1997 it was a public building that could accommodate large groups; residents and volunteers were served food and drink there during the flood. The role of the Community Center as a central meeting place in the community was made evident in one comment about community recovery. The Community Center, in one resident's words, was a 'place to share experiences, bond as a community, support each other.' There are other annual events within the community held at the center which accentuate belongingness and attachment (e.g., suppers, Community Theater). One person described the community center as 'like home' where 'everyone is welcome; everyone belongs.'

The small size of Ste. Agathe, as it is now, appeals to some residents. Illustrating this point, one community member said he wants 'a prosperous community but not booming.' He believes that a 'loss of sense of community comes with (increased) size.'

6.2.2 Past flood experiences

The flood of 1997 was a disaster for the town of Ste. Agathe as the water poured overland into the town unexpectedly, rather than from the river. It is indelibly a part of communal and individual memories and likely to remain a reference point for events in the town for many years to come. It changed the face of the town with the loss of homes, reconstruction of new homes and other community buildings, relocation of riverside homes, loss of long-term residents who failed to return to Ste. Agathe after the events of 1997, and loss of local businesses that failed to rebuild after the flood waters receded. These changes were evident in photos and narratives that accompanied photo reviews with community members. The following is an encapsulation of some of the memories and reflections residents shared.

One of the most common photos taken by community residents was of the local school (Figure 6.6). They shared that in 1997 it suffered significant damage and was repaired; additional sections were also built. One person shared that the small French school, which is also symbolic of the French culture, is of great importance to many people in town and that

after 1997 'people felt that the school would be lost. They had to fight to keep it…to keep the school in the community.' Some people had thought the school would be closed.

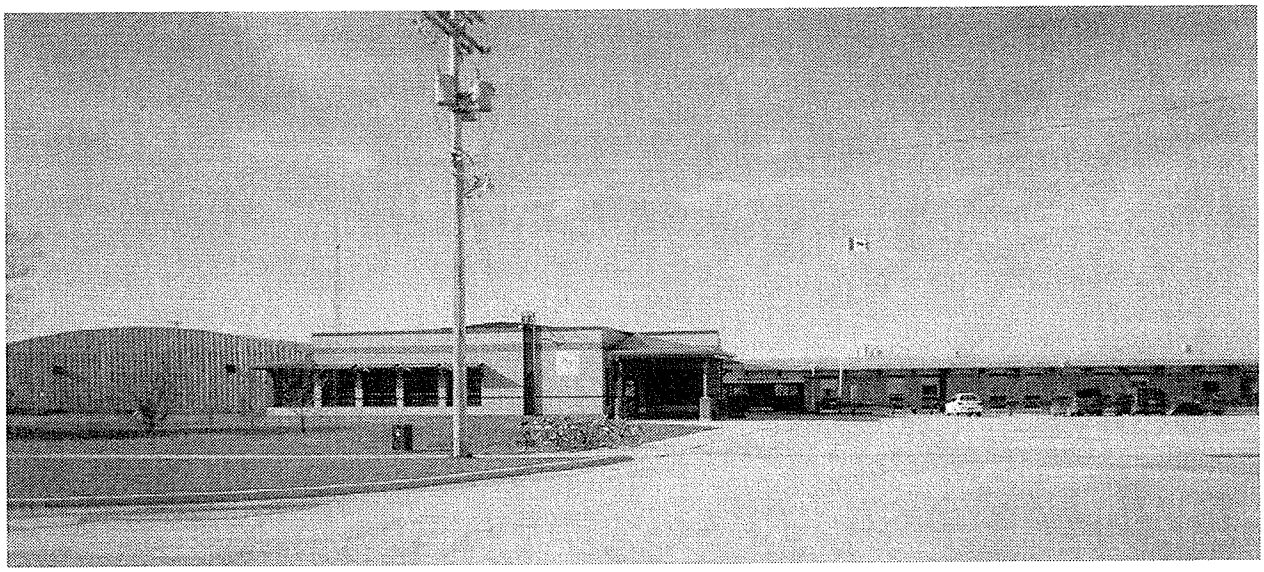

Figure 6.6 – Ste. Agathe French School

A few people took photos of the convenience store and service station in town (Figure 6.7); they were built after the flood. One member of the family that was involved in these business ventures said that before 1997 the family owned a store across the street from the new one, a grocery store that was torn down after the flood. They felt they 'had to build something (for the town)' after the flood, showing their commitment to their community.

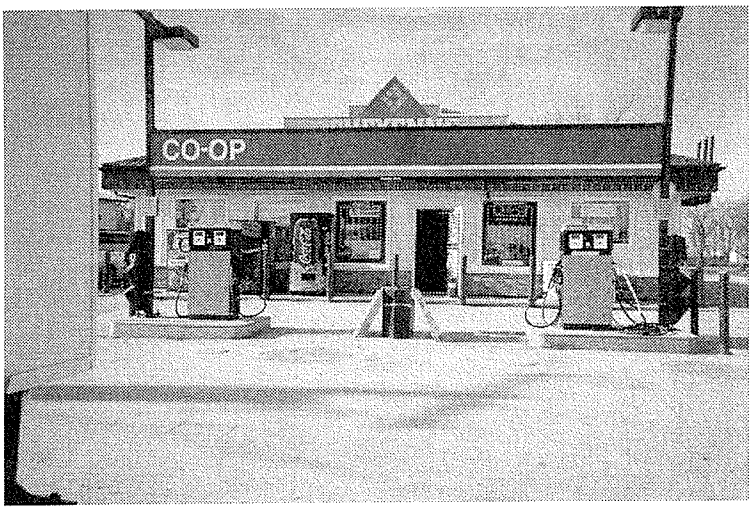

Figure 6.7 – New CO-OP store and gas bar

There were also photos of the town arena which prompted discussions of how it was used during flood preparation. Residents shared that army personnel stayed there and the building contained the stockpile of sand for sandbags.

It was common for participants to take photos of their own homes, often in reflecting on events of 1997, or in reflecting upon the rebuilding process after the flood. One participant took several photos of his house, noting that following the 1997 flood they had reconstructed their home and added on to it. He claimed they had wanted to give a signal both to people within and outside of the community that 'Ste. Agathe will not drown', but it will 'thrive and prosper.' This resident noted that the town in some ways had very bad publicity as a result of 1997. This was a recurrent theme among residents who found that the constant references to the events of 1997 and particularly the inundation of the town (as depicted by media photos), now essentially cause harm as a constant reminder of flood vulnerability.

To counteract perceptions that the town is vulnerable, one resident claimed the town must market itself, and 'reassure people that the problem in 1997 was the West Dike (constructed by the Province) and not the river'. His meaning here was the often expressed opinion by townspeople that the Province's construction of the 'west dike' to enhance protections for Winnipeg actually was a cause of the overland flooding into Ste. Agathe.

6.2.3 The river and the town bridge

'The bridge is used as a water marker. Local people judge water height by the piers.'

Some participants chose to take photos of open areas along the river such as the one below in Figure 6.8. The resident described the photo as a view looking northward along the Red River. In discussing the photo of green space she said 'at one time, prior to 1997, homes were along the river but are now gone, bought out (by the Province). Some people stayed and

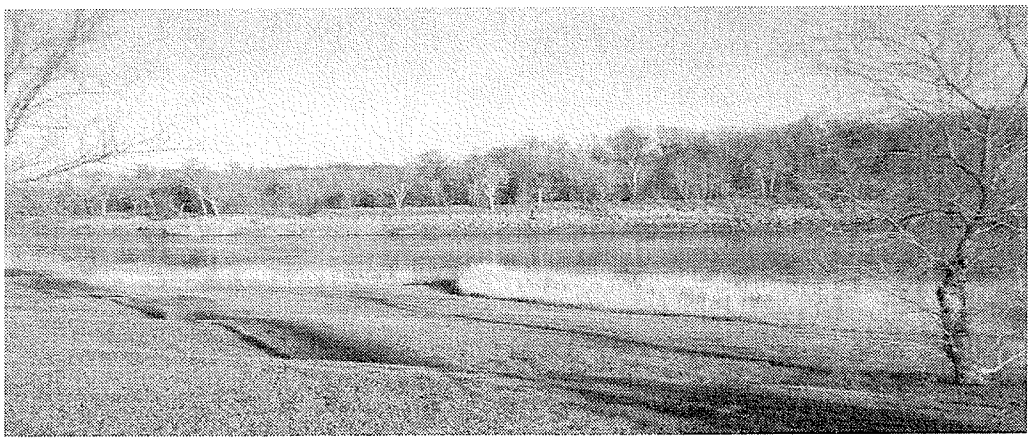

Figure 6.8 – Red River erosion behind home

some people left the town…about 25% left.' These properties were bought out because they were very close to the river and needed to be removed to build the town dike along the riverbank. The issue of erosion was also raised as this area is prone to erosion and some residents that are along the river are losing increasing amounts of property to erosion every year (Figure 6.8).

There were also many photos of the bridge in Ste. Agathe (Figure 6.9). While symbolic for community members in various ways, one person recounted that in 1997 they had received a call in the middle of the night that 'the water was in town.' People then had to go up on the bridge on foot or with vehicles to escape the rising water. The participant described the bridge as 'the escape route for the boys left behind (to care for the town)' given that other highways such as #75 were under water, and the last exit route from town was over the bridge.

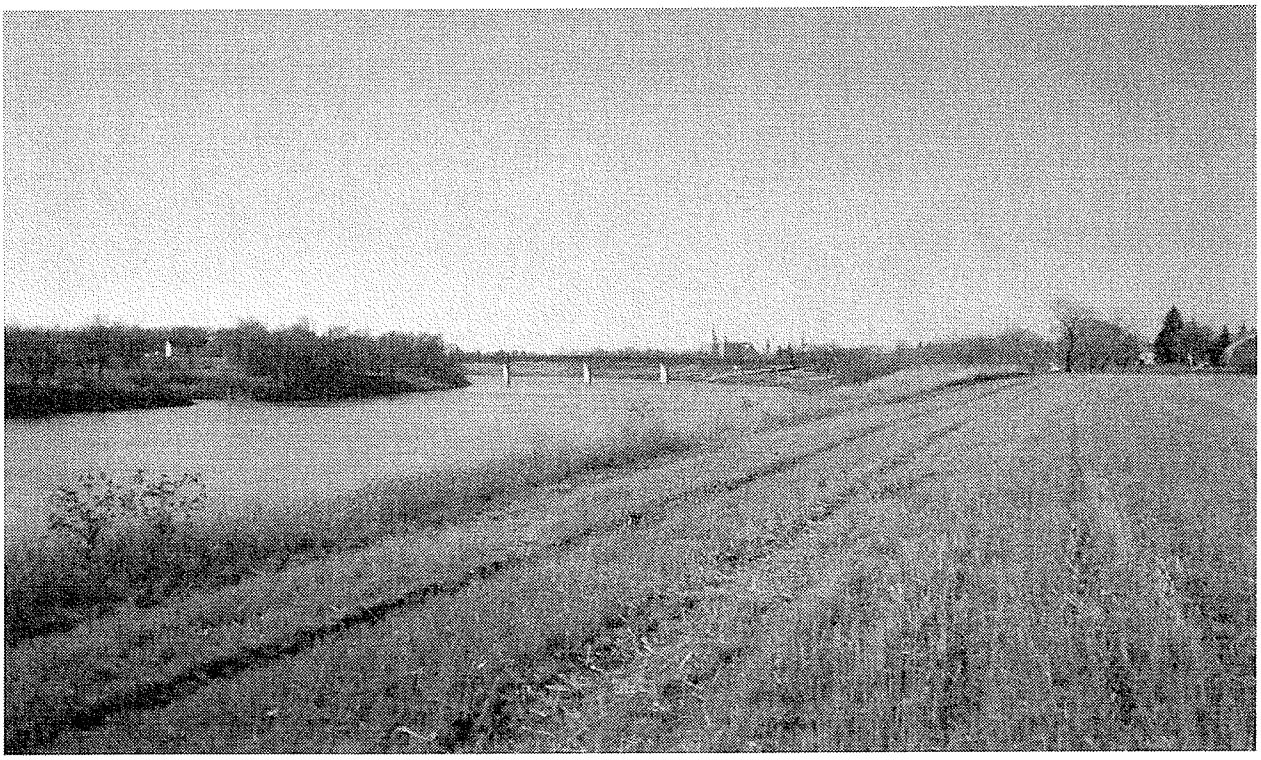

Figure 6.9 – Ste. Agathe bridge, view from north of town

Another person described that they also took the photo because the bridge was the only way out of town in 1997… 'The water almost reached the bottom of the bridge – was about 2-3

feet below it.' In the group meeting people also discussed how people vacated the town via convoy over the bridge, a memory and image that was very powerful in their descriptions.

In more general terms the bridge was described as a 'water height marker'. Residents shared that local people judge the height of the water, and the flood risk, by the 'piers of the bridge' (Figure 6.10). One person also said that she observes the behavior of the rapids behind her home to assess the nature of the water in the river, levels and flows, etc. During group discussions there was mention of how 'high' water in the river vibrates the bridge and is discernable when you walk across it.

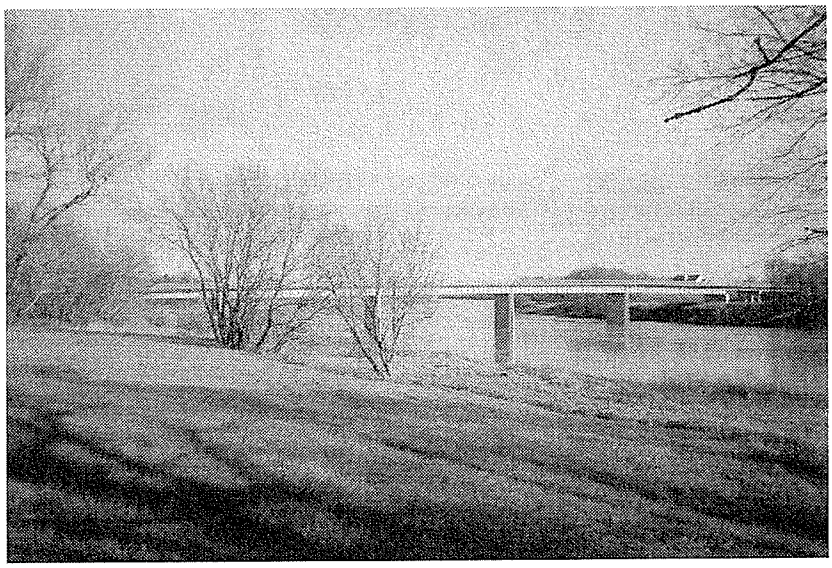

Figure 6.10 – Ste. Agathe bridge, view from south

It also should be noted that in both individual interviews and in group discussion, it was repeated regularly that Ste. Agathe is in fact one of the highest, if not the highest, community in the Red River Valley, a point of key significance to community members in discussing flood vulnerability and the events of 1997.

Photos of the bridge were also taken to depict its value as an important landmark in the community. It was noted that river communities have their own individual bridges with 'their own beauty and character.' Another noted that there is 'community history in the bridge' as he reflected back to a time when, as a boy, he would use the ferry (which was south of the current location of the bridge) to cross the river. During the group meeting to review the photos, the historic significance was discussed.

There was also quite a lengthy discussion among the group of participants about the recreational value the river used to have to the community in decades past. There were curling bonspiels under the bridge, and skating and hockey on the river. There was a community myth about the 'shot (of a hockey puck) that went all the way to Ste. Adolphe' (a town many kilometers north). In summer, docks and waterslides were available and children used to spend many hours fishing. Now, members of the group claim that the 'river keeps going up and down so much it is too much work to keep a dock there now' and ' the water level is like an elevator, high water, more current ...it is just more dangerous.' The group also noted that while the older youth and adults have been disappointed with not being able to fish as in the past, the younger children do not miss it as it was never part of their lives, again speaking to the many changes to communities along the river.

There was some speculation about these changes, with many thinking the river has changed very significantly in recent years; the ice created is rougher, there is more water on the ice, and the banks are eroding, which makes access difficult. Erosion increase was generally considered to be in large part related to the operation of the floodway. There are also fewer families and therefore less people to do the work of clearing off and maintaining ice for recreation. One long-time community member mentioned that he had canoed recently on the river for the first time in several years and could not believe the damage on the river bank from erosion; he also noted that some households who built dikes along the river after 1997 now have homes caving into the river as the dikes collapse, increasing the risk that they will flood in future.

6.2.4 Flood water levels in 1997

It was common during interviews to have people reflect on how high the water was in 1997 relative to some marker in town or relative to their home or street. One person recounted in vivid detail how in 1997, after the evacuation order, he walked from the town bridge to his home, 'through two feet of freezing water'... to see if the water was in his house and to find the 'dog and cat that were left behind during evacuation.' He explained that the animals had been left alone in his garage for seven days, and he had gone to check on them. They both survived the ordeal.

6.2.5 Criticism of government

A theme throughout interviews in Ste. Agathe was a sense of disappointment with how the government (primarily the Government of Manitoba) had handled various issues in 1997. In brief the criticisms took the form of comments about a lack of communication - 'we should have had two days notice regarding the cutting of the roads; then people would have taken their stuff out and people could have diked their homes'. One person noted that he had had only one hour to evacuate what items he could. There was also the aforementioned criticism of the construction of the West Dike by the government which many thought the cause of the town's flooding.

6.2.6 Losses

'Expropriation, the term used by the government, means you have to leave everything behind.'

A variety of photos taken by participants are of plots of land (i.e., building lots) including some that are empty of buildings since the 1997 flood; they have a strong symbolism. Some were of lots where previously there had been homes that were expropriated to build the town dike after 1997. Still others were of homes that were totally rebuilt after 1997 so they might be less vulnerable to floods; often, for example, these rebuilt homes have been elevated above 1997 flood levels or an earthen dike has been constructed around the home. The 1997 flood changed the physical quality of the town substantially.

In showing a photo of one community home, a participant claimed that extended family had lived in the home for decades, surviving several floods, only to finally succumb to the 1997 flood after which they had to have a home totally rebuilt. The participant said 'the 1997 flood did it- water was up to the roofline.'

Other participants took photos of their private homes to show either the height to which the water had gone in 1997 (using a certain point on the home as a reference) or to show changes

in the home since 1997. Rebuilding was required in many Ste. Agathe homes. Some residents were happy to make renovations on the one hand, and felt something positive (however small) had perhaps come out of the experience. Others spoke a bit longingly of their home or landscaped yard as it used to be prior to 1997; one person commented that while the home has many new elements after rebuilding, some aspects were nicer – or perhaps more meaningful - before. For example, in one instance the previous landscaping had been done over many years and had only been completed just prior to when the flood occurred. There was a sense of loss in terms of the investment of time and energy over many years even though they were compensated financially and had done new landscaping. Attachment to their home was very evident. It appears the nature of the attachment may have changed as a result of the flood; again an irretrievable loss was sustained. The redone landscaping did not replace the loss of a yard lovingly worked on over years.

There were accounts of how, following repairs, there have been emerging damages to some homes which residents attribute to the flood. In one instance the longer-term damages to emerge well after the initial flood event took the form of, for example, bubbles in wood flooring, mold around windows, difficulty closing kitchen cupboards due to shifting, etc. Longer term impacts were also described as a 'snowballing situation' by one participant. In one instance, for example, a window was removed, mold was spotted, and then mold was found in the surrounding drywall and so on, with new more intense levels of repair emerging.

There were personal stories of expropriations. One person noted that in 1997 compensation policies were not applied consistently. There were expressed resentments towards the Provincial Government (particularly Land Services Management Branch) for inconsistent and changing policies related to whose land in Ste. Agathe must be expropriated, what should be done with expropriated land, and who could purchase expropriated land if it was put up for auction. The process of expropriation for some people was very painful and confusing, and a great loss in their lives. One photo depicted a lovely view of the river side (Figure 6.11) which was a view from one participant's home prior to expropriation of his property. A participant also took a photo of a play structure (Figure 6.12) used by his children that was one of the only things they had salvaged from their old home and taken to their new home

after the flood. It remains symbolic perhaps of their old home and its loss. The play structure was also photographed to represent the participant's children as they are one of the reasons that the family remains in Ste. Agathe, to offer a quality of life that they value.

Figure 6.11 – Expropriated river side lot

One person had a photo of trees visible on an open green space along the river, trees which he had planted and nurtured in his old yard. Again this was reflective of a loss sustained.

Another participant opted to take photos of a vacant lot to illustrate the loss of a close friend whose property had been expropriated. She explained during the group meeting 'the river took them away.' While they have remained close by, the move from the immediate neighborhood had altered the relationship and how frequently the two friends, once close neighbors, see each other.

Group discussion of the issue of expropriation revealed that thirteen riverside properties were expropriated and, of these, only four of the families remained in Ste. Agathe, a significant loss socially and economically to the community. This type of loss increases the vulnerability of the community through diminished social networks.

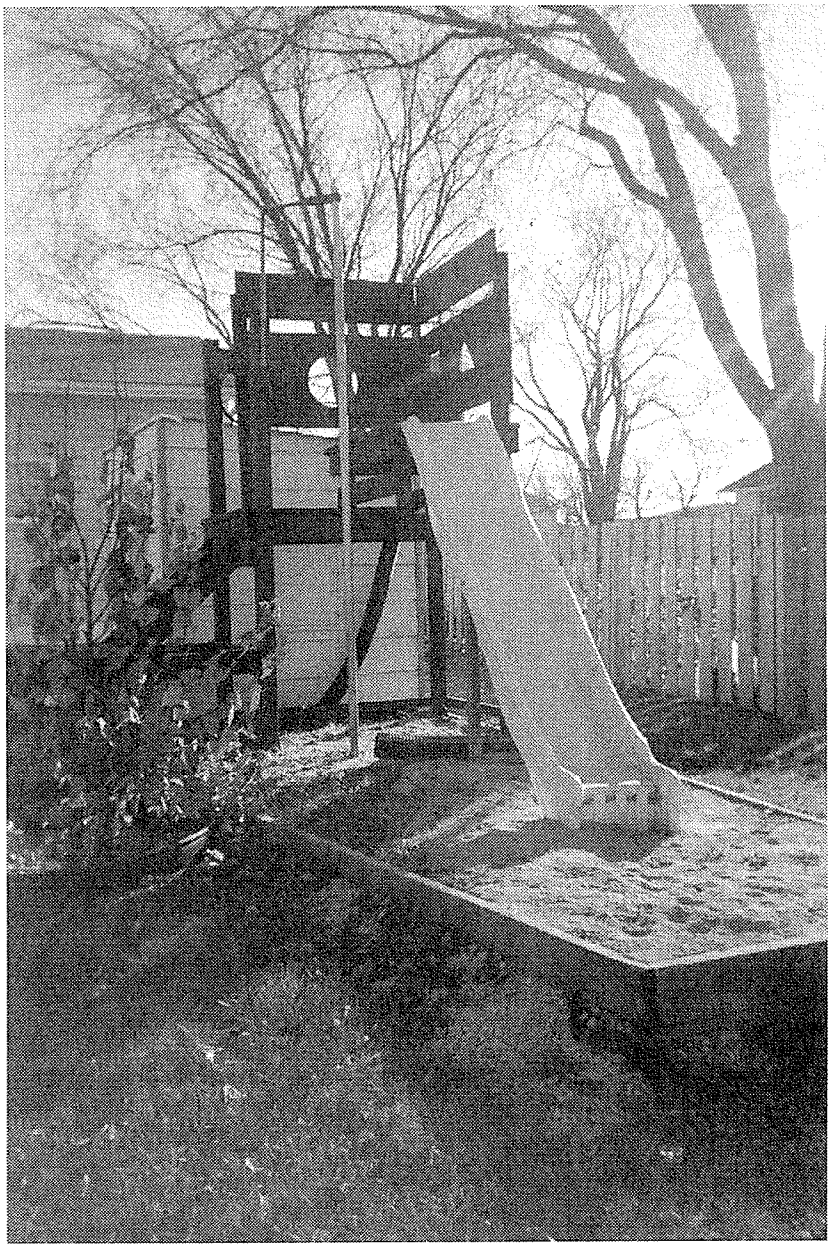

Figure 6.12 – Play structure moved from old home site

In a story heard several times in conducting research in Ste. Agathe, one resident showed a picture of a lot and driveway which used to be where her elderly parents lived (Figure 6.13). In 1997 they lost their home; there was over a meter of water in their house. They had to move out of the community to which they were devoted, and eventually settled in a seniors' home in another community. There were comments about a general loss of elderly folk from the community, who struggled to face the difficult and demanding challenges post 1997. This

has been difficult for residents and has changed some of the character of the community. Other participants took photos of gravestones to represent parents or other family members, or original homesteaders in the community. The gravestones depicted community ties and continuity.

Another person used a photo of an area alongside the river that is vacant to simply represent the loss of a local informal recreational area along the river where families used to meet and

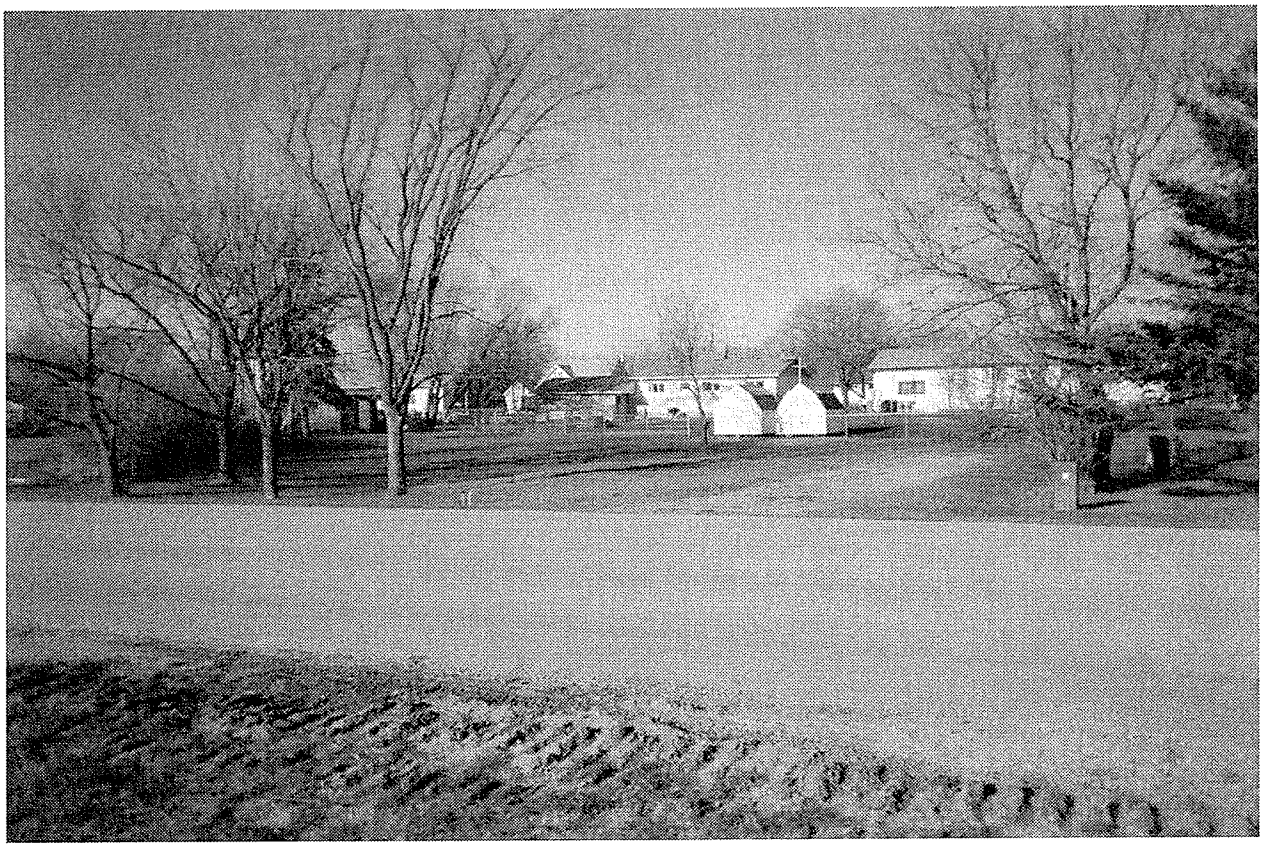

Figure 6.13 – Empty lot where parents' home stood prior to 1997, now a symbol of loss and community change

toboggan right out onto the river; it was a 'social gathering' in her words. The area was changed as a result of constructing the town dike after 1997. There is no longer a suitable incline for tobogganing and there have also been rocks placed there to prevent riverbank erosion. The participant spoke of how this unfortunate and unforeseen consequence of the creation of the dike has impacted young families unexpectedly, with no plans to create an alternate slide area.

A final loss noted by residents was seen in photos of the old grain elevator along the highway into town. One person said that grain elevators are of historical significance for old agriculturally based communities, noting they have been called 'prairie lighthouses'. The local one, like many others in Manitoba, has been shut down in favor of a few larger grain elevators on the prairie landscape. The resident had this to say: 'When something shuts down, part of your community shuts down…part of a (agricultural) livelihood is no longer there, taken up by modernization.' Other people took photos of the grain elevator to also represent what has always been 'a landmark in the community.'

Another subject of photos by participants was the area where the old Ste. Agathe park (Figure 6.14) was located, where the old baseball park was across the river from Main Street. Residents were well aware that the area, while beautiful, was in a 'soup bowl' and flooded repeatedly. After 1997, the whole Cartier Park recreational area was developed as an alternative but is not on the river. One person noted that it was 'sad' that it was not possible to keep the old park area as it was a lovely spot in the community.

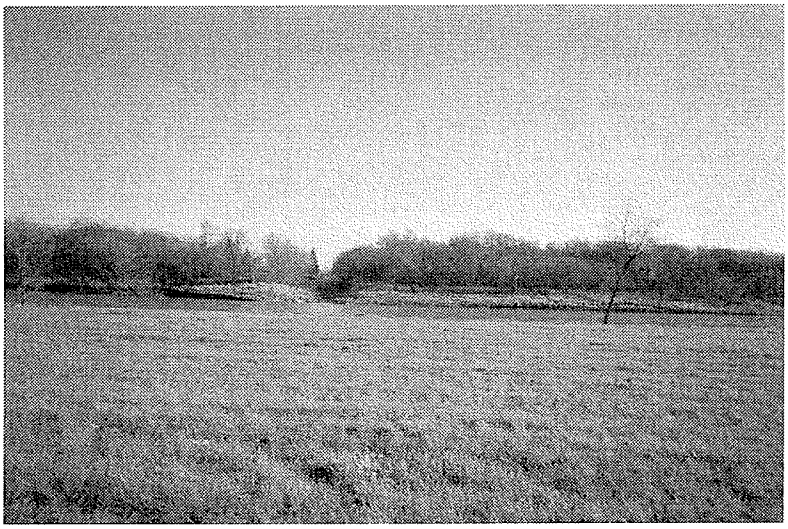

Figure 6.14 – Old Ste. Agathe park and ferry docking area

6.2.7 Church and faith

'You can identify with the church, identify with your religion, identify with worship.'

Many participants took photos of the single Catholic Church in Ste. Agathe (Figure 6.15). This church was prominently represented in television and print media during the 1997 flood and is still seen when media refer to the flood even nine years later. A resident stated quite emphatically that he didn't like the photo of Ste. Agathe and the flooded church appearing repeatedly in the media, as recently as 2005. He felt that the losses and damages suffered by the community were recently being exploited by the provincial government when the media showed the flooded church in describing the government's rationale for expanding the floodway in Winnipeg. The irony is that community members in Ste. Agathe feel that the expansion will in fact potentially harm them by artificially raising the local water levels whenever the floodway is used. In addition, the focus on the damages and losses in 1997 were seen in one participant's opinion to represent Ste. Agathe negatively or certainly as highly vulnerable to flood -'I want positive ideas not negative ideas (about the town in the media).'

In describing other reasons for inclusion of a church photo, a resident referred to the church as symbolizing 'the lifeblood of our community...people meet to worship, nourish spiritual needs.' The church also symbolized that 'spiritually and emotionally we had survived and would move on.' One person noted that there were 'things to be thankful for' in the aftermath of the flood. In reflecting on the period after the 1997 flood, a resident claimed that the first mass, held about two months after the event, was very poignant for community members. For some residents the damage the actual church building sustained was very personal- '(it) hurt members of the community to see the church like this.' At a more tangible level, the church was and is also the site of important events within the community such as baptisms and confirmations (of faith).

One participant also noted that church attendance has generally seemed necessary to participation in the most influential (although secular) group within the community - the Ste.

Agathe Economic Development Committee (SAEDC). This resident claimed that generally 'if you are not French and not Catholic, you do not know what is going on (in the community).' They also claimed, however, that 'it is better than it used to be' in referring to difficulties faced by those who are not French Catholics who want to become involved in local decision-making. One person reflected that it seemed that, with the flood of 1997 particularly, those people who were not French decided to move out of the community altogether, as the flood exacerbated pre-existing feelings of exclusion from the community.

The discussion of faith in the group was difficult and emotion-laden as community members grappled with the issue of reduced church attendance especially by younger families, and some participants noted that church has less allure than in bygone times. Some participants claimed that the mass after the 1997 flood, when residents returned, was a symbol of solidarity in the community; yet there was a general perception in the focus group that the church is no longer playing the major role it used to. It has lost a leadership role. In individual interviews the importance of church and faith to individual members of the community was highly evident, but there are evidently changes in the church's role over time.

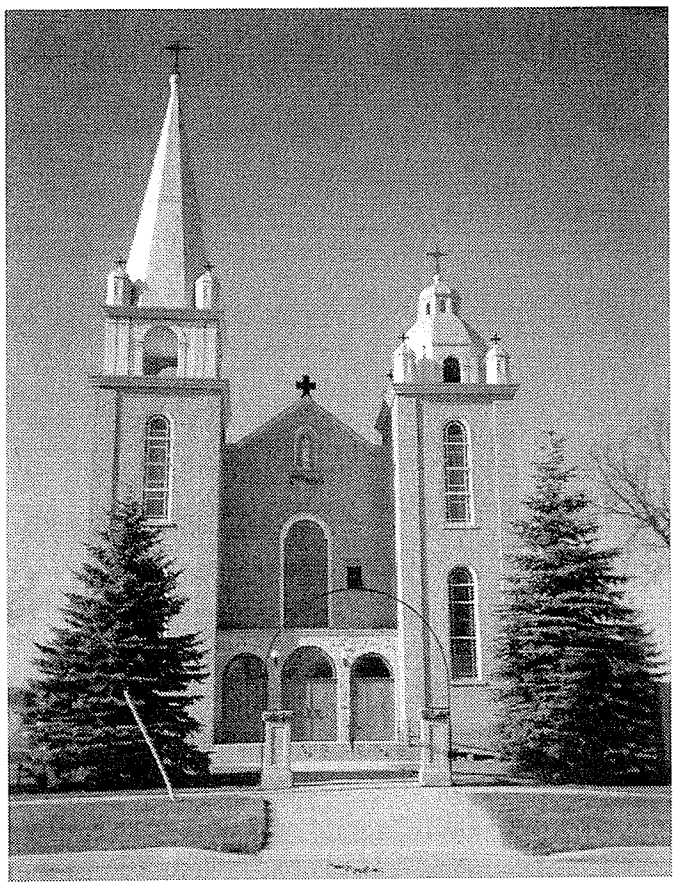

Figure 6.15 – Church, a symbol of survival

6.2.8 Economic development

There is hope for 'new development and, with it, some new people and a younger generation.'

The SAEDC, with its economic mandate, was described by one participant as the 'most influential committee' in town and 'male-dominated'. It was suggested that the membership is older, and the process for getting on the committee is unclear. As one person noted 'the SAEDC seems to take on all issues in Ste. Agathe without consulting with the rest of the community.....it is not publicized what they do...town members don't get information.' Transparent inclusive processes are necessary to engage community members and capitalize on the wide range of social capacities that may exist. Otherwise vulnerabilities can be created, particularly if some community groups are omitted from decision-making or information exchange. That being said, however, the general view communicated during interviews is that the committee is also of vital importance to the community in adopting a leadership function on many issues. Of primary importance after 1997, its key members have advocated and worked on the two major areas of local development, namely the Cartier Industrial Park area with its Flood Interpretive Center, and the new subdivision, Point Eau Claire (Figure 6.16). Both were seen as important to community recovery from the 1997 flood. The park is intended to generate tourist business as well as industrial development; the subdivision will attract new families to the community.

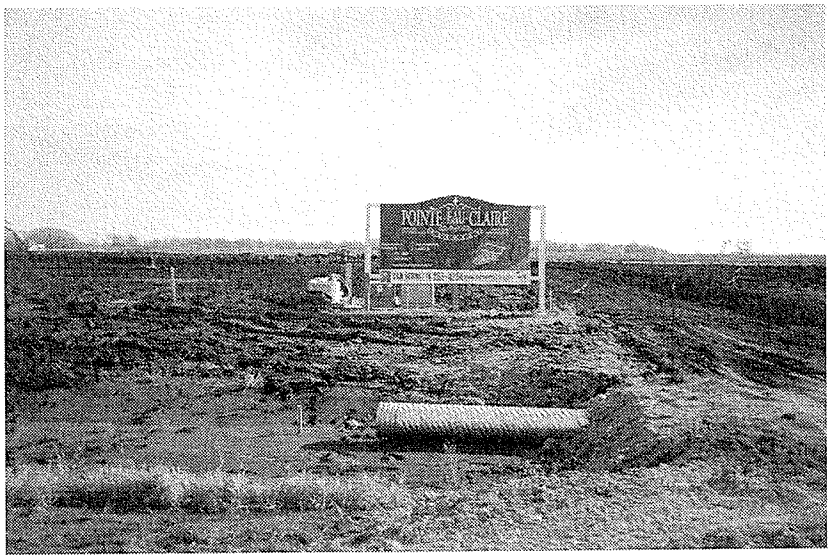

Figure 6.16 – Pointe Eau Claire sub-division

The new housing division is a particular symbol of hope and growth for the community and was included among photos taken by residents. At the conclusion of data collection in 2005 the lots had been for sale for

roughly one year. Of twenty-nine created lots, seventeen had been sold. The group of participants was pleased that some purchasers include younger families.

6.3 Addressing vulnerability through mitigation

During discussions of participant photos there were several issues that surfaced related to mitigating future damages from flood events as well as adapting to the flood risk in Ste. Agathe.

6.3.1 Land use

For example, a few residents focused on the need to develop Ste. Agathe within the context of the flood risk, i.e. taking that reality into account. The restrictions on development imposed by the province after 1997 have perhaps helped the community to recognize the reality of flood mitigation as a relevant and perpetual issue for the community. For example, the provincial government will not permit permanent structures in town directly along the river where property was expropriated after 1997. There are also the legislated requirements for all structures within the floodplain to be constructed or protected to levels equivalent to 1997 flood levels plus 0.6 meters.

One enterprising resident noted that the community is considering using the open areas between the river and the main street for development (Figure 6.17), recognizing that any structures there must be temporary, meaning removable, so that the dike along the river can be accessed by WCIS and enhanced as necessary during high water. Consequently, there have been discussions of the possibility of having a farmers' market in that area. This type of creativity and adaptation (Mileti, 1999) has the potential to reduce vulnerability in the long-term.

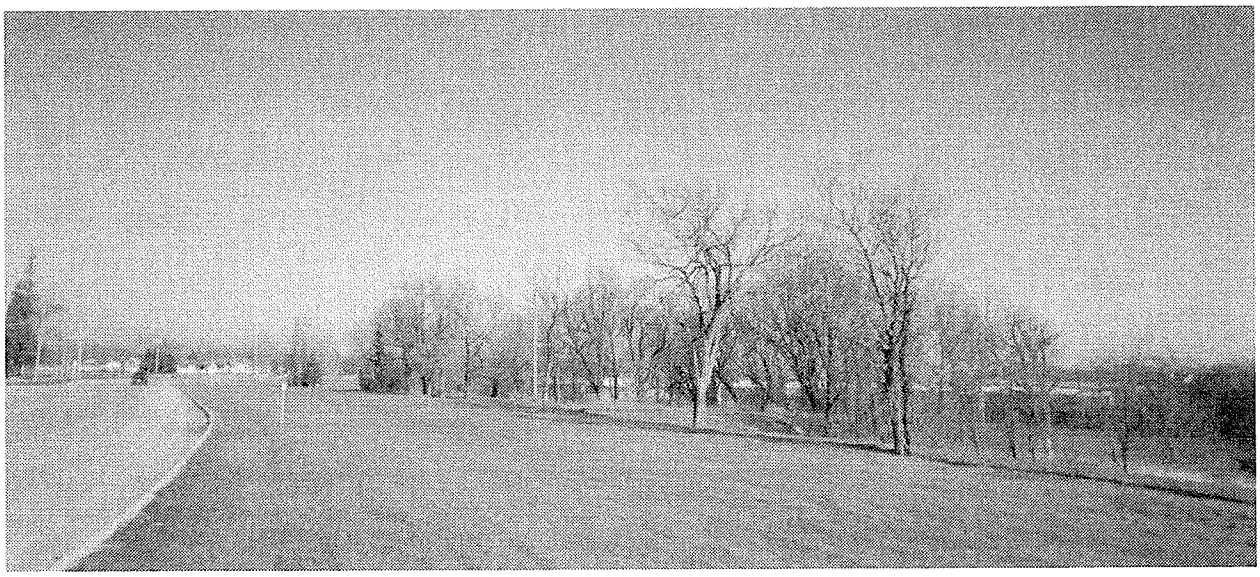

Figure 6.17 – River area now available for development but not for permanent housing due to flood risk

Figure 6.18 – Culvert

In Ste. Agathe there are continuing land use concerns about the problem of inappropriate drainage off of agricultural land artificially elevating water on the landscape. One resident's photo of a local culvert (Figure 6.18) was taken to illustrate that, in his experience, there has been considerably more water on the landscape in recent decades; he described the changes in human practices on the landscape as potentially creating vulnerability. He questioned how these issues might be addressed.

6.3.2 Challenging government and the floodway expansion

It also was abundantly clear in Ste. Agathe that many community residents believed that the river was not the cause of flooding in Ste. Agathe in 1997, but rather the cause was the West Dike (also called the Z dike) constructed by the government to protect Winnipeg. In their opinion, the West Dike directed the water towards the town. Residents believed this dike and various government actions such as cutting roads diverted the water into their town from behind. Indeed, as noted earlier, the water did come overland. The group said that the government has denied that their actions caused flooding 'because it would mean compensation.' Now with the expansion of the floodway underway, the municipality of Ritchot, on behalf of Ste. Agathe residents, has taken legal action. They have gone to the Federal government to oppose the Environmental License provided to the Province (to allow them to proceed with the expansion). At the time of writing this dissertation, the federal response to this legal matter is pending. There is particular resentment that the likelihood of higher water from floodway operation has been given only cursory attention in public hearings and reports required by the Environmental Impact Statement for the expansion. Some participants see this as evidence that the needs of city citizens are seen as more important to government decision-makers.

The nature of community criticisms related to government decision-making are captured by reviewing comments made at the focus group meeting when the new town dike was discussed. Members of the community were concerned with the height of the town dike in an area near the train track. Based upon their experiences with previous floods, that diked area does not appear high enough. They arranged to have WCIS come out and discuss their concerns; they were told the engineering model was correct and if the water does go too high, the government will make the dike higher. The government representatives were perceived as quite inflexible, very attached to their models, rather patronizing, and dismissive of local peoples' perceptions and experience. Most assuredly the communication and dialogue did not improve relations nor trust between the community and government personnel.

6.3.3 *Dike issues*

Over half of the photography participants from Ste. Agathe spoke at least somewhat positively about the dike as a decisive action to reduce flood vulnerability taken by the community and Province in Ste. Agathe. Some clearly saw the dike as instrumental to plans to economically develop the area. The large sign at the site of the new housing development in town (Figure 6.19) prominently shows the location of the new dike which serves as added protection for the new development. One person stated: 'Thanks to the dike…new development is possible.'

Figure 6.19 – Subdivision sign showing location of new dike

Figure 6.20 – New town dike

Some people also had criticisms or concerns related to the new dike (Figure 6.20). In discussing the town dike, one person claimed, 'No way (I) feel less vulnerable due to the dike.' He went on to explain that this is because three sides of the dike are complete but in a

flood, a fourth side must be constructed at the time. Similarly another person who took photos of the dike said: 'my biggest concern is that there is no "real dike"'. He was referring to the fact that the town has a core dike that would need to have height added to it in the event of a flood. 'It is like an unfinished dike.'

6.3.4 Emergency management plans

Actions taken by the Manitoba Emergency Management Organization (MEMO) in working with the local municipality and town were also seen as generally a positive step towards vulnerability reduction in the event of a flood. For example one person noted that there has been a preliminary MEMO meeting (held locally) to go over evacuation and the dike closure plan (for the area of the dike that needs to be closed during a flood event). Someone else stated with some frustration that there is no more need for planning - what is required is *implementation* of planning by MEMO and others. According to one participant, MEMO came out to see if there were local people to sit on an emergency response committee (if necessary), slated for spring 2005; interestingly this is eight years after the 1997 flood. However, as one person claimed at least 'now people are talking about it (i.e. emergency response)...unlike in 1996 (i.e. prior to the last large flood).'

Criticisms of the new emergency response planning for the town were evident. Criticism was directed at the decision to have the emergency committee centered in the town of St. Adolphe in a flood event. Concern exists that this town, which has the municipal offices, is in fact cut off by water on the highways before Ste. Agathe. The choice of this town was described by one resident as 'not sustainable given where the water goes... and therefore a poor decision.'

6.3.5 Decision-making

When it comes to the issue of who does make the decisions on local actions to reduce flood risk, not surprisingly the SAEDC was seen as the most influential local group. One person noted that while they were not sure 'who had influence (on how to protect the community)... (but) SAEDC certainly did!' He also said that they had foresight regarding the need for growth of the community.

Linked to the issue of decision-making, and government and community interaction, is a key criticism noted during the focus group session in Ste. Agathe. It was explained that while residents may want to dialogue with government personnel on key flood issues 'people in government change so often, you have to start your story over again, so eventually you throw your arms in the air (give up).' Creation of trust between government and community residents is then compromised through institutional personnel change.

All in all, there was a general sentiment expressed in the final group meeting in Ste. Agathe that the government has not been forthright with this community in dealing with issues related to the events of 1997. Similarly, the plans to expand the floodway to protect Winnipeg, the conducting of hearings to consider possible negative impacts to communities south of the city such as Ste. Agathe from operation of the floodway, as well as WCIS's handling of questions about the suitability of the height of the town dike have all reinforced feelings of mistrust between residents and government. This serves to also further the notion that government is not highly inclusive of community stakeholders in relation to flood mitigation decisions.

6.3.6 The Red River Valley Flood Interpretive Center: longer term adaptation to flood threat

'There is a need to put flooding into perspective.'

There were many photos of the Red River Interpretive Center (Figure 6.21) which is along the highway adjacent to Ste. Agathe; it is a project initiated and conducted by that local community with particular effort by key members of the SAEDC and funding through various government grants (e.g., Western Diversification). It contains photos, documentary sources, and memorabilia from the 1997 flood and pays tribute to the suffering, volunteerism, heroics and sheer grit of individuals and organizations in handling both response and recovery from this disaster. It is contained within the new Cartier Park development, where the funds were used to begin development of a campground and recreation area as well as the Center. One resident who participated in this research spoke most eloquently about the role

of the Center itself for both the community and the Basin in general. He noted that the role of the Center can be encapsulated as follows: 'educate the general public and school children regarding the Red River Valley environment.' He stated: 'we are getting better at this, a better understanding of the river and better able to protect ourselves.' This is a 'viable place to live. There is a need to put flooding into perspective.'

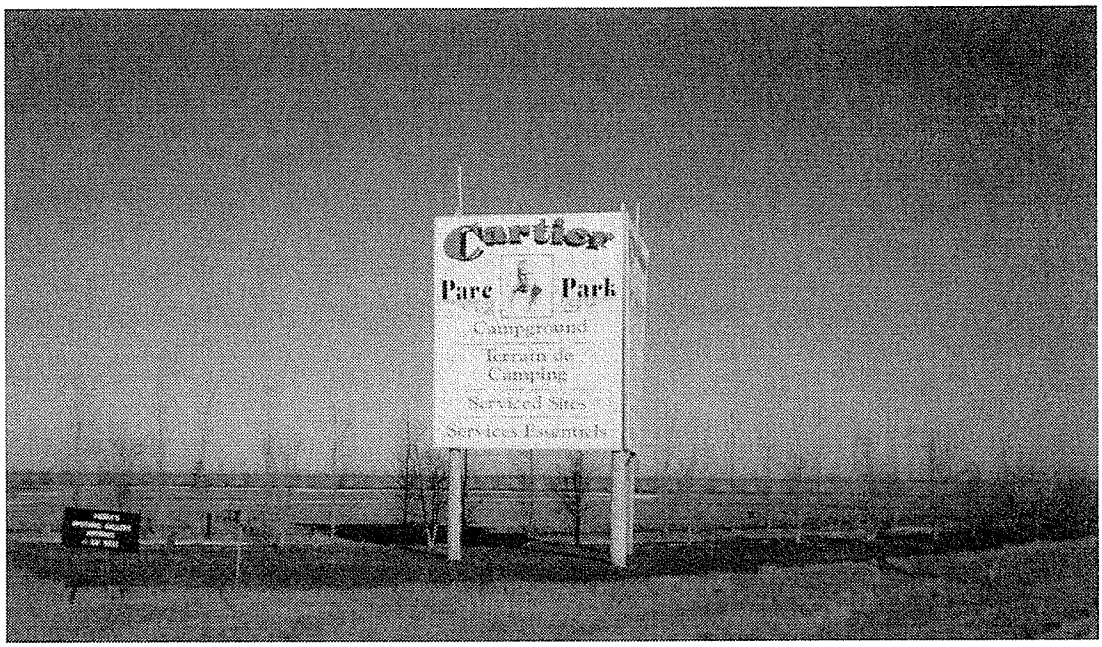

Figure 6.21 – New park and campground

Community residents also desire Cartier Park and the Flood Interpretive Center to draw in tourists and campers, so that the area might be designated a tourist attraction by the Province. The campground was described as a 'new birth' for the community. The plan for the campground development is a long-term one in which more trees and bushes will be planted and a manmade lake developed.

At least one resident noted the difficulty with using a disaster event as a draw to bring people to a community. He noted that the museum (Center) 'puts a mark that we are a flood zone - (thus) the museum is both good and bad.' Like the images of the church noted earlier, the message of the Center is in some ways contradictory. Clearly it is two-fold, highlighting both flood vulnerability and endurance – simultaneously the positive and the negative.

6.3.7 Ste. Agathe: reflections on flood vulnerability

Ste. Agathe residents were able to elucidate some of their hopes and priorities for the future in the face of various sources of vulnerability that they described in discussing the photographs that they took. Most particularly, residents spoke of a need for planning that acknowledges and incorporates the flood risk as illustrated by two quotes below.

'The community needs to be built so it can go under water.'

'(We need to) integrate the flood risk into planning.'

There were two motivations driving this need for improved planning from residents' perspectives. One was the apparent objective flood risk illustrated by the events of 1997. The other concern included a belief that people and businesses outside of town perceive the flood risk to be significant – most notably more than in neighboring communities – and therefore are less likely to move to or invest in the community. Taking proactive steps to address the flood threat through planning is in part seen as a measure to counter the perception that Ste. Agathe is highly vulnerable. The importance of addressing both objective risk and perceived risk (by outsiders) if Ste. Agathe is to prosper was highlighted in discussions with community members

'The flood risk is influencing the (community) vision; people fear Ste. Agathe as a flood zone; because it can happen once it can happen again.'

'People will go elsewhere before Ste. Agathe, even along the river elsewhere.'

While planning was seen as important to the future of the community, there was cynicism about how plans are made and executed to mitigate the flood risk locally. Mitigation appears to be consistently viewed by residents within the context of the relationship between the community and authorities such as WCIS and MEMO; this is a relationship which appears problematic. Residents believe they flooded in 1997 due to the government's actions in

constructing the West Dike to protect Winnipeg and that government would not claim responsibility.

'In 1997 the community had a bad rap. The Province wouldn't own up to the role of the Z dike in flooding the town.'

Some townspeople believe they are being threatened now through the construction of the floodway expansion, a government initiative. Furthermore, when they expressed concerns about the height of their new town dike, they felt their concerns were largely dismissed by government engineers. Within this context it is not surprising that participants expressed little sense of local control over decisions and frustration about their vulnerability, specifically linking it to senior government decision-making.

'Province makes the decisions…no choice in the community for nothing…they pay, they do their decisions.'

'We had consultation meetings (on flood vulnerability) just for "fun"…the meetings wouldn't change the outcome…people stated their concerns but nothing was changed.'

'Posturing and a desire for political goodwill is the reason for consultation now.'

Amid these struggles however, there are some actions that have been taken at a local level that residents feel lessen their flood vulnerability. In general, the construction of the town dike, while not without controversy, and initiatives to develop a more detailed Emergency Management Plan for the town are viewed favorably and offer some assurance of reduced flood vulnerability for the townspeople.

As explained by participants who took photos of the town dike, it reduces vulnerability in several ways. Most obviously, it offers a physical barrier to flood waters. It also has allowed for new residential development within its confines (namely the Pointe Eau Claire subdivision). The 1997 flood, as noted earlier, resulted in the loss of some community

members. This loss of people, some of whom were long time residents, meant loss of social capital in this small community and raised fears that, like many rural communities, it may decline. This new development offers hope for the future.

Similarly, the creation of Cartier Park, with industrial and recreation facilities, was seen by residents as, in part, a proactive community-led response to the events of 1997. They have marketed the industrial park, and developed the Red River Basin Flood Interpretive Center. For participants in the photography exercise they felt less vulnerable as a result of actively marketing the strengths of their community. They have also attempted through the Interpretive Center to educate about the nature of flood risk in the Basin, from a perspective that knowledge and experience may be used to better prepare not only Ste. Agathe, but other Basin communities, to handle flood hazard. This ability to change adversity into opportunity, and convert experience into knowledge is a social variable that reduces vulnerability to hazard. In addition, placing vulnerability in its multiple contexts enhances understanding of its creation.

Residents of the Basin expressed the view however, that complacency - long the challenge to hazard reduction, is likely to continue to confront communities. One participant, in considering the issue of a long term vision for the community given the flood risk, had this to say: 'The problem is complacency- during dry decades- locally and at a higher level.' For some community members the role of the Interpretive Center is, in part, to counter such complacency through education of Basin residents, youth and visitors. Clearly there are people with foresight within the community; one person who has spearheaded the Interpretive Center initiative did express his dismay that financial and other support for the Center is difficult to attain, particularly in the longer term.

6.4 Emerson, Manitoba

6.4.1 Character of community residents

A number of photos elicited comments about the character of people in Emerson. In relation particularly to flooding, one resident had this to say: 'far too many people are too satisfied...there is cause for satisfaction but (we) need to do something to ensure the thing

(i.e. the town) continues'. In this case he was referring to a need for people to focus energies on ensuring community viability. Another commented that 'people may be apathetic and satisfied'. One person explained that within Emerson 'opposing views may be difficult, (as) being confrontational is not acceptable'. This was also verified in comments related to the lack of proactivity among residents with regard to a community vision or planning for future floods - 'People don't take the time to ask (questions) unless something happens...people take a lot for granted, (plan to) continue the way we have, that is with the dike'. The implication was that townsfolk sometimes believe that the dike is *the* required action to reduce vulnerability.

There were also general comments about people's attachment to the community, and to their personal homes and properties. One comment included: 'People love their homes and yards...people spend time in their yards and beautify.' (In Emerson) there is 'quality injected into lifestyle and home'. In relation to floods, one person stated 'We would lose everything in a flood, (but) we would rebuild'. As was seen in photos, people readily identify with a more rural lifestyle and landscape, including the river and gardens.

6.4.2 Quality of life and security

Community Facilities

Many participants took photos of community facilities such as the community complex, town hall, arena, hospital (Figure 6.22), seniors' home (Oakview Manor), New Horizon's Senior's Center (Figure 6.23), library and various other buildings which house services available to residents. One person noted that the Community Center complex and curling rink play an important role in case of emergencies. They noted that it is well-stocked and used regularly, for example in winter to

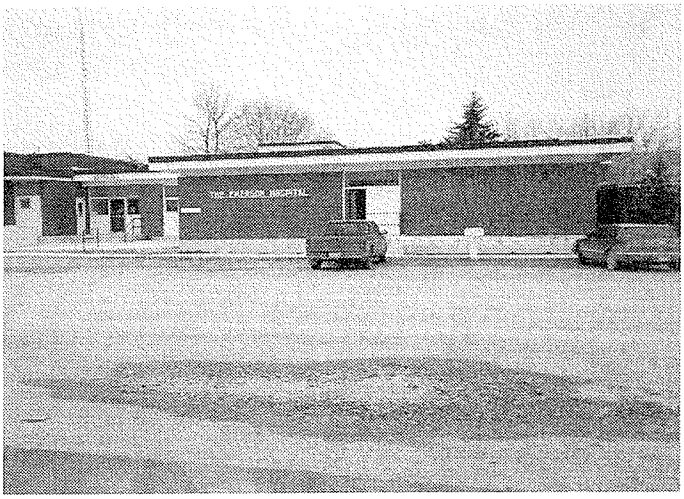

Figure 6.22 – Emerson Hospital

house people caught in snow storms that are traveling through and get stranded at the border. An arena building photo prompted memories of the 1997 flood as one participant recalled that Canadian Army personnel stayed there and it was there that sand for sandbags was stockpiled.

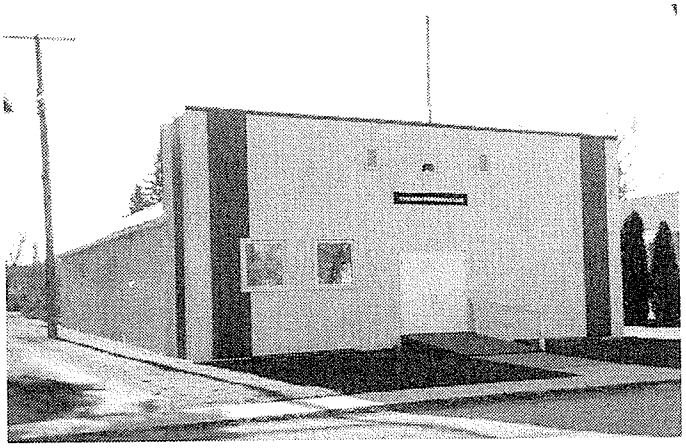

Figure 6.23 – New Horizons Seniors Center

In general there were many comments by residents about the comfort afforded to them by the knowledge that there are so many services available if you are elderly or ill. The population of Emerson, as noted earlier, is older. One resident stated that most of the small communities in the Red River Valley do not, for example, have a clinic with long term care beds. Emerson actually had a hospital until very recently (roughly 3 years ago) which many participants noted was a huge loss to the community; they do still have a well appointed clinic. It was explained that two forces behind the change was the movement towards centralization of medical care to larger urban centers and problems in staffing doctors for 24 hour shifts at a hospital. Hence the downsizing occurred which some saw as a degradation of small rural communities.

Seniors' facilities

The New Horizons Senior Center was an important attribute of the town of Emerson for several people who took photographs. It supplies recreational and social opportunities for seniors and is, a 'gathering point.' One person noted that the seniors' services in town such as New Horizons 'keep seniors in their own homes and programs for as long as you can.'

There are a personal care home and other seniors' housing which was described as 'one way to keep people in the community....people don't need to leave town when they can't manage their own home.' One person said that in their opinion 'you'll make acquaintances but not friends if you are forced to leave (your community as you age).' Attachment to this

community was evident in this and other comments particularly by the long term residents. Of the personal care home, one middle-aged participant said 'there is a personal care home for my later life.'

Recreation

'Why come to Emerson…we have a beautiful park, golf course, campground.'

There were many photos by residents of Emerson that described how leisure time is spent. As one person stated '…recreation is 'historically important to the town.' Some of these photos included recreational facilities such as, for example, the arena, pool (Figure 6.24), curling rink or baseball diamond. One comment about the park area, which includes pool and baseball areas as well as picnic areas, was that the 'pool equals quality of life, especially for the children'. Another person stated 'it is well-maintained – wonderful…open and easy to access, lots of hours open to the public.' The current pool is the third one in the town's history; the first was located near the river but had to be moved due to risk of flooding. In terms of the cost of a community pool, one person noted that while the 'cost-benefit results are not good', there are 'intangible benefits.'

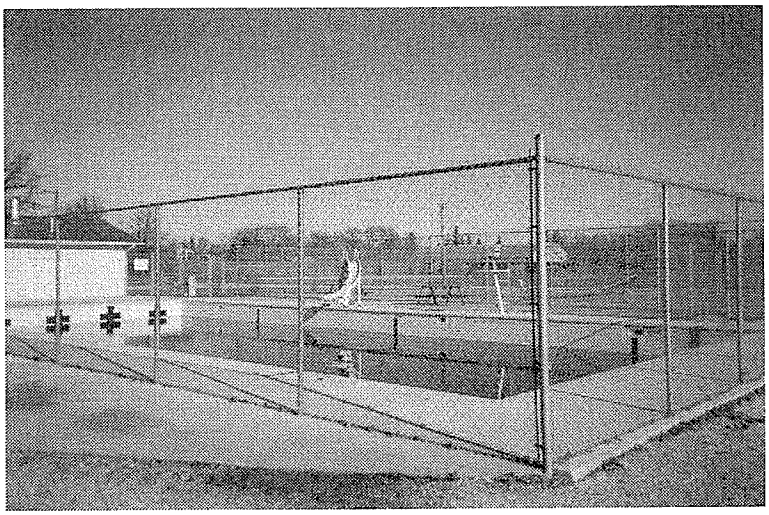

Figure 6.24 – Emerson pool

Figure 6.25 – Recreation park

One participant noted as she reviewed a photo of the park (Figure 6.25) that 'benefits outweigh the costs of living here' a reminder echoed in numerous interviews that quality of life is a key value among residents. Another resident who moved in recent years to Emerson noted the welcoming nature of the town and the opportunities to socialize that are available.

There is a long tradition behind the local rink. Residents shared that it was originally built back in the 1920's. It has natural ice, and hockey and figure skating are offered to youth. These are run by volunteers. There is pride in the community that they offer these when the community is relatively small and has been decreasing in population. One participant said that the rink is a 'center of winter activity…people congregate there'. Another person explained that the rink 'keeps kids off the street.'

There are links through recreation to American communities just across the border as American children come for Red Cross swimming lessons; this is difficult with border security increasing in recent years. In fact, there have been attempts by the town to meet with border officials about how cumbersome the border process is for locals who wish to regularly cross it for personal or social reasons. There has been no real success at addressing the issue. Local people see the ensuing loss of cross border interaction as a loss for the entire community, and for small communities on the other side of the border.

Floods and recreation

Floods have had significant impact on the golf course (a local feature of which the community is very proud) in Emerson and the recreation park. One person noted the golf course is something to attract people to the community. He further observed 'recreation and relaxation value is great in Emerson.'

The golf course itself (Figure 6.26) was described as 'a meeting place… meeting and greeting' where all ages participate. The attractive riverside golf course is, however, in a very low spot and floods extensively during high spring water. It was first built prior to the 1970's by two couples and volunteers and then slowly expanded. It was devastated in 1997. The community has discussed moving the golf course but that would be very costly. There appears to be some division in the community about what to do about not only the risk of spring floods, but also the fact that recent wet summers have rendered the course almost unusable for large periods of time in summer.

During the focus group meeting there was considerable interest and passion about the issue and real concern that changes in climate, and drainage patterns south of Emerson (which result in increasing water loads in the river) will likely cause further problems with the golf course location.

Figure 6.26 – Emerson Golf Course

Problems with the location have actually existed for decades. For example, at one point the golf course was reverted back to farmland and then revived again. During group discussion with community members it was evident that there has been a battle to keep the golf course

functioning, with many disappointments. A consultant has been hired to propose options to flood proof it.

Symbols of security

In group discussions of the photos there was confirmation of the important role the fire hall personnel play in any type of personal or community emergency in Emerson. There was reflection on the 1997 flood and their key role, which included providing security following evacuation - namely, refusing entrance to the town. During the focus group one person said that the town council was looking at plans in future to fine people $10,000.00 if they would disobey an evacuation order during a flood. When this was raised in the focus group, the statement resulted in some rancor. This was illustrated by one resident's defiant declaration that they would pay the $10,000.00 to get to their home in that event. It was obvious that while people in Emerson were extremely cooperative with evacuation orders in 1997, they prefer to see it as a somewhat 'voluntary' action and do not like to feel that their rights are being undermined as the use of fines might suggest.

Population concerns

Concerns about the diminishing population in Emerson were evident in many interviews and group meetings with Emerson residents. This was represented in part by the many photos taken of Emerson school. The recurring theme in participants' reflections on the school was the importance of the school for keeping young families in town; namely, there was concern that without a school, young families would not want to stay or move to Emerson. In the focus group it was apparent that there have been discussions about closing it for some time. Reference was made to how Emerson was a 'booming town' in the 1970's, unlike today. One person claimed it is now a 'bedroom town, with no more business.' Another noted that there are a few new people in town, a few young families, and newly retired folks, many of whom previously had a connection of some type to the town.

6.4.3 Community buildings: pieces of history

Many of the photos done by residents of Emerson were of buildings and structures and how they have defined the past and present character of the community. One example is the beautiful town hall (Figure 6.27) which has been restored and is currently in use.

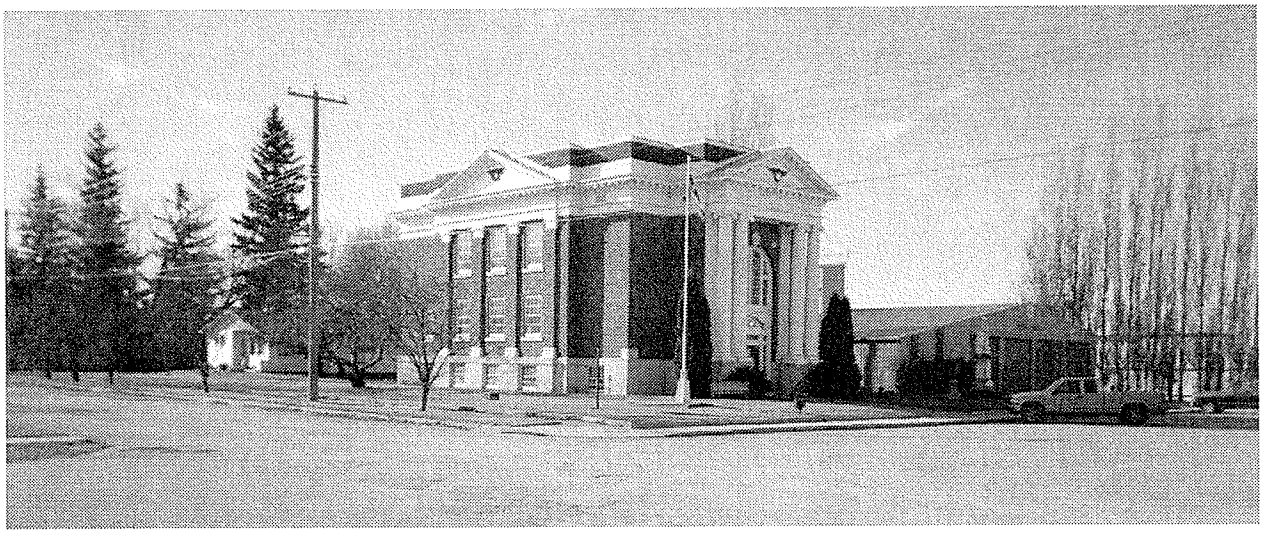

Figure 6.27 – Historic Town Hall

Many photos were taken of churches (Figure 6.28). Some were taken to indicate a historical significance. In fact, the community just recently purchased a historic church so they might turn it into a type of museum. On the other hand, some people took photos of the church buildings (of which there are several) to depict the changing demographic in town as populations decline and less people attend. Several different churches in town were photographed. There are United, Baptist, Catholic and Anglican (no longer active) churches in town with, in the words of one resident 'dwindling congregations and resources.'

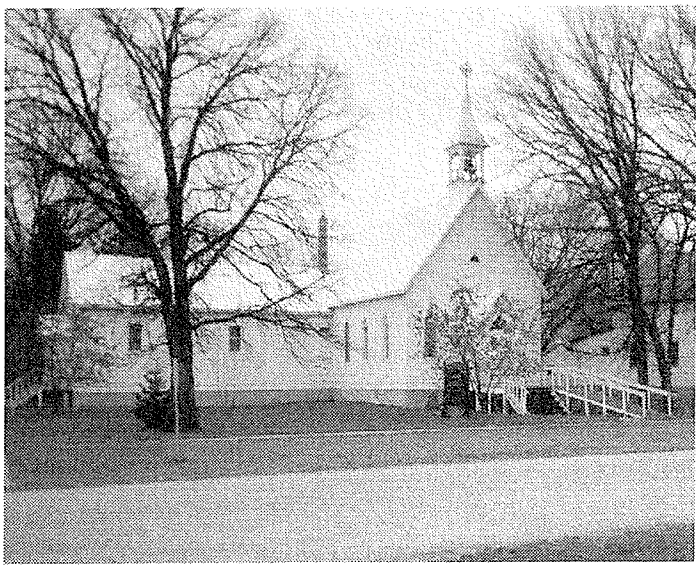

Figure 6.28 – Historic Anglican Church

In relation to a church photo one person said it referred to 'declining rural population … congregation diminishing results in closures' of churches. He also

speculated 'maybe church is not as important to this generation.' One church photograph was taken to represent 'togetherness' in the context of 'family and worship.' Another participant took a church photo to represent the 'need to preserve religious values through church.' According to one resident, the social function traditionally performed by the churches in town was to provide service to, for example, needy families or other types of assistance to members of the community.

6.4.4 Economic development and business interests

'If I was a business man what could Emerson do to entice me (to start a business)?'

People in Emerson displayed dismay over the loss of small local businesses in recent years. They see it as tied to the increasing mobility of people, the decline of small family farms, general rural depopulation, and the population decrease in Emerson itself. One respondent, upon reflecting on this issue, posed the question: 'If I was a business man what could Emerson do to entice me (to start a business)?' He felt the enticements were few, and people's increasing mobility causes them to go to a few larger centers for shopping or other services. In the focus group one person observed that there used to be four family farms per mile on the landscape and now it is hard to find a single farm. At one time, farm families would retire in the town of Emerson. In addition, it was noted that many people work in Emerson (including the border) but no longer live there.

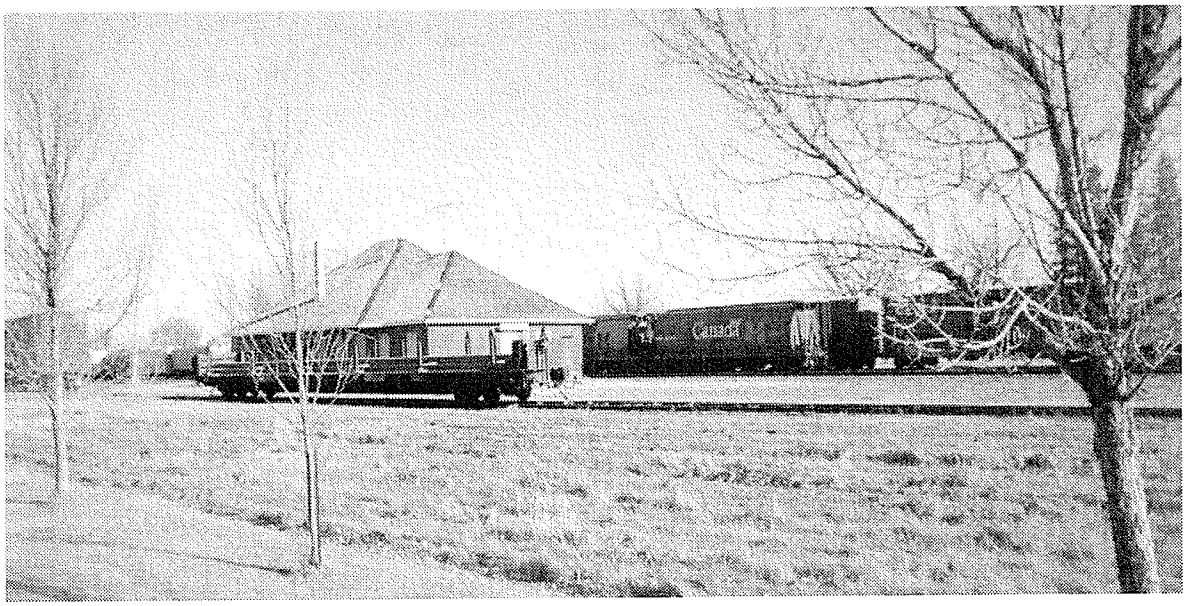

Figure 6.29 – Railway station

This is a wider spread problem throughout the southern Red River Basin as smaller communities collapse and more urban centers attract people from neighboring towns to live and to shop. One person noted that there have been significant changes that have affected Emerson very keenly. For example, automobile and implement dealers have been 'gutted out of rural communities.' CN (Canadian National Railroad) has pulled fifteen people out of Emerson alone in recent years. CP (Canadian Pacific Railroad) also removed people from the community. These were once key industries in and around Emerson (Figure 6.29). A general loss of railway branch lines and the closing of community grain elevators have all impacted the community according to long-time residents. As one person said – 'It all makes a difference to the rural community.' Another stated: 'Small businesses are the backbone of the community… (we) need these businesses to contribute to the community.'

6.4.5 Cross-border relations: the Canadian-American border

'Devil's Lake diversion will result in more water and biotic (contamination)... we need to be more diligent.'

The border itself is seen as 'crucial to the town of Emerson.' There were a number of photos of the border taken by participants; they reflected on the historical significance of the border in the initial creation of the town of Emerson and how recent changes in border security and employment practices (namely more jobs going to people not living near the border itself) have altered the face of the community. One person noted that now helicopters and planes patrol the border, changing the character of a region that was at one time characterized by farming activity.

One photo depicted the road to Noyes, Minnesota (Figure 6.33). It is looking north from highway 75 about 1.6 kilometers from Emerson. It shows the town dike on the south side and an area that during a flood often needs to be sandbagged. The Emerson resident stated that during flood conditions Emerson has taken control of sandbagging this vulnerable area and that the small communities such as Noyes on the American side are appreciative of this, an example of cross-border cooperation.

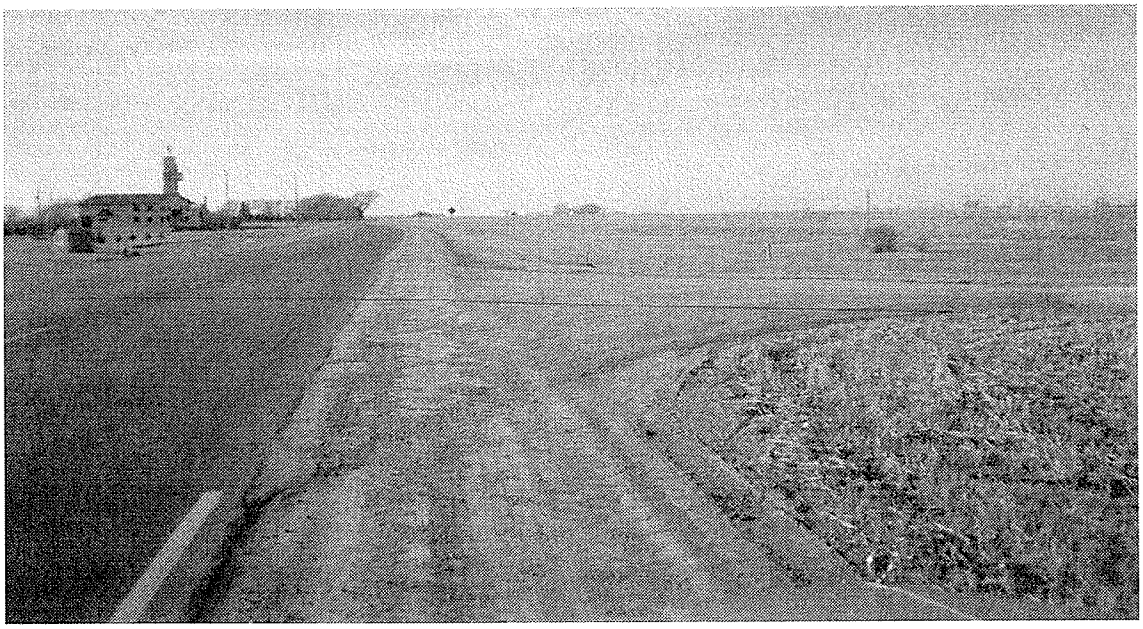

Figure 6.30 – Dike on west side of the Red River

Another photo shows the dike on the horizon (as it is since 1997) on the west side of the river (Figure 6.30). In 1997 Emerson ran out of sandbags and when the American Army Corps of Engineers decided that the nearby American town of Pembina could not be saved from flooding they gave the bags to Emerson.

Emerson residents are aware of the more contentious issues plaguing border relations as it relates to the flooding issue. Locals made mention of, for example, the United States attempting to sue Manitoba for an east-west road in the region that backs water up into the States - 'U.S. water, ironically enough' one person claimed. Americans want the road taken out.

When it comes to flooding one person proposed that for future flood damage mitigation planning there is a need to examine how much extra water depth is likely in Canada due to levees and dikes in the United States; they emphasized the need to consider American flood proofing structures and how they will alter levels of water in Emerson.

Another resident discussed the problem of the Devil's Lake diversion that was open this past summer (2005) allowing water to flow from this American lake through the Sheyenne River and into the Red River. The measure was taken as a flood control method to reduce water

levels on Devil's Lake which has been subject to repeated flooding in recent years. However, there are many questions about the transfer of this water into the Red River water system. As one person from Emerson stated: 'Devil's Lake diversion will result in more water and biotic (contamination)... We need to be more diligent.' She claimed 'We have given up control over water levels; they are potentially controlled by a foreign government.' She asks what if American actions flood the area or contaminate the water and claim it is 'just an error?' 'There are still consequences for us.'

6.4.6 Past flood events

'I never expected any damage in town. Since 1950 we have had no damage ... we are well-prepared but the levels were way higher than expected.'

The Emerson data from residents that related to past floods can be broken down into two main categories: those related to descriptions of past flood experiences prior to the town being protected by a town dike, and reflections on what occurred in 1997.

Figure 6.31 – Historic post office

The references to past floods were largely anecdotal. One participant included photos of historic buildings (reportedly built in the 1920's) such as the post office (Figure 6.31), and the telephone office (Figure 6.32) – the latter no longer in use - which she recalls were surrounded by water in past floods. In her private collection of photos she had some that depicted buildings surrounded with water during previous floods.

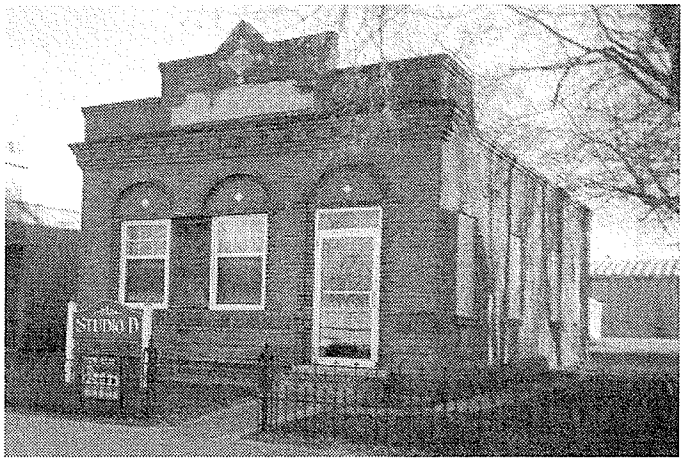

Figure 6.32 – Historic telephone building

The photos above show the buildings as they appear now. Both buildings had 1.8 meters of water in them in 1950 according to one participant. Her own home had been spared due to its location as the water crept through the town to within half a block of her house.

Sandbagging during the 1966 flood kept the water out of the telephone office. One participant remembered climbing over sandbags at that time to get into the building. This resident of Emerson, like other participants in the research, appeared to view the past flood events as a community struggle in which the community fought valiantly, and from which it recovered.

The second category of photos and commentary related to past floods focused on the 1997 event. Various respondents made reference to the 1997 flood. Like the quote in italics above, many feel very secure now. Some participants felt very positive in general about the outcome of the 1997 flood as reflected in comments such as 'we stayed dry and no one got hurt.'

One respondent shared that the events of 1997 were nonetheless surprising to residents. He reflected back upon his feelings as the flood event unfolded. He noted that when the town received an initial warning in 1997 there were no visual cues of potential flood i.e., the water was not visibly rising which surprised him. A late snow storm in April, followed by a speedy melt, however dramatically accelerated the risk. He explained 'I never expected any damage in town. Since 1950 we have had no damage…we are well-prepared but the levels were way higher than expected.' He did expect to be evacuated as that was a usual action taken during floods for many decades back to the 1950 flood.

The theme of minimizing both the flood risk and the content of risk messages appeared in other interviews. One person noted that a town councilor in 1997 was issuing assurances that there was no problem (with a pending flood) until, in fact, residents saw the devastation to the south on television (e.g., the city of Grand Forks). Then attitudes towards the level of risk changed. The importance of visual cues - i.e., visual footage of water rising - to confirm risk is worthy of note. Television coverage offered that cue. A resident stated that things changed dramatically within 60 hours. 'They (the town) got caught there (not fully prepared), but did

luck out with the weather.' Residents shared in group discussions the general feeling that things could have become much worse in 1997 if the weather had deteriorated, particularly with heavy rains or winds.

6.4.7 Preparation 1997

One respondent shared that historically the town of Emerson has enjoyed 'really good relations' with the Americans as when the Americans gave Emerson sandbags in 1997. The resident did note that relations and cooperation were better in the past than currently. This was confirmed in the group meeting as members of the community exhibited some nostalgia for the degree of mingling across the border and cooperation which has slowly been eroded. The era following the September 11, 2001 terrorist event in New York has accelerated that process according to residents.

A planning problem related to sandbagging for protection was raised during photo interviews. Specifically, in 1997 while volunteers were available to help sandbag the town, in the aftermath there were no volunteers available to help get rid of the contaminated bags after the flood. In any town, but particularly one with an aging population, this is a problem.

6.4.8 Vulnerability reduction measures

The most frequently taken photos of measures to reduce flood vulnerability were structural measures, more specifically the town dike - either photos of the section of the coffer dike between the main street and the river, or photos of the earthen dike surrounding the town. Photos of the fire hall were also common as symbolic of emergency response (a nonstructural measure); they were discussed by participants in the context of their thoughts about vulnerability reduction.

The role of the town dike

It is 'what you depend on to defend the town…you hope it will be big enough and strong enough to hold the flood. It did last time.'

Participants' comments about the town dike focused on the additional security they feel as a result of having the dike and, conversely, the vulnerability they feel due to limitations of the dike.

In discussing the security afforded by the town dike, one woman provided the above quote about the dike; another person remarked that they do not see flood as a factor in the town's problems '(We) alleviated vulnerability by the dike.' One male resident said the dike 'is the reason we are all here.' He further wondered what would happen to the town in the event that the dike is breached in a flood and people left, never to return. The assurance offered by the dike is substantial in this community, and the thought of it failing in a significant way is difficult for local people to comprehend in terms of what it would mean for Emerson's future.

As illustration of the security provided by the recent addition of a dike in West Lynne (a community within Emerson located across a main highway), one resident photographed the new dike (Figure 6.33), describing what needs to be done in a flood: '... (you) just need to put a berm between the dike in the picture and put one in the foreground. This contributes to security. The town will only need one day to close it (in a flood) – with dirt and heavy equipment. Before they used to need days to put earth on the road instead...'

Another photo was taken of Sixth Street in town. Reflecting on events in 1997, a resident noted that there was 1-1.5 feet of earth across the road at that point during the 1997 flood and it was here that a police barricade was set up so people could not go back into town (once evacuated). This helped to save the town.

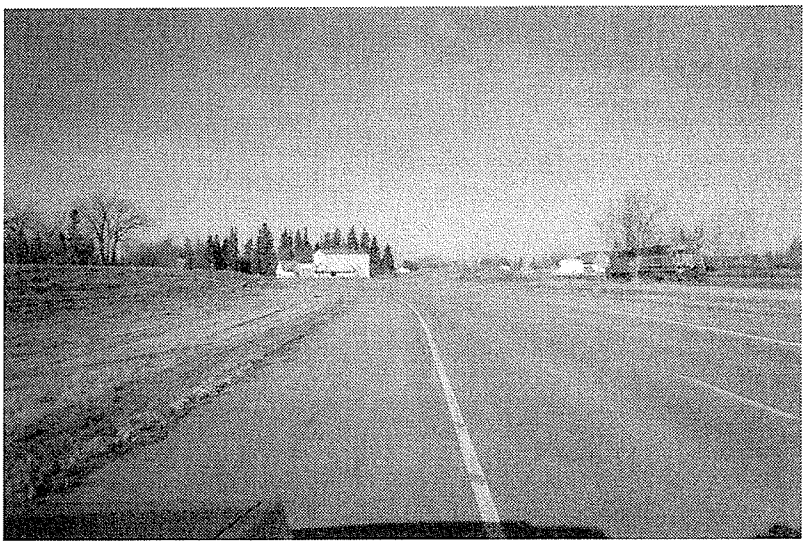

Figure 6.33 – Town dike near American border

One elderly resident explained that at one time, prior to the town dike being built, there were properties along the main street in town that had to be sandbagged. When the town dike was built in 1967 (following floods in 1965 and 1966) several homes along the river were bought out, with two or three of them actually being moved elsewhere.

Several people offered fairly detailed descriptions of the town dike. In one instance the description was to illustrate some of the problems with the dike that in fact contribute to a sense of vulnerability rather than security.

For example, in showing a photo of the coffer dike along Main Street (Figure 6.34), this resident said: 'The dike is sinking into the river, the riverbank needs stabilization. The trees behind it prevent erosion but we are losing about three feet a year of the riverbank. The coffer dike was built in 1979; before it (the dike) was dirt.... (The coffer) dike consists of metal sheets with dirt between, one side hammered into the earth about eighteen feet deep.'

Figure 6.34 – Coffer dike

The question of dike maintenance came up in another interview where one resident shared that he knows that there is a 'problem with maintenance of the dike... who does look after it here?' Of the town dike he also said:

> The coffer dike running from the hospital and post office is the lowest part of the dike. It represents the negative and positive (related to) peril of the town. Most of the dike is earthen with grass; (however) this (coffer) section could bulge and burst. It is

> not as wide as the rest of the dike. Maybe it needs strengthening and improving. It must be fixed in a dry year; (we) need funds to do it. Unlike much of the diking system this has not been (improved). This dike limits activities – business – in the town. There is little expansion room.

These comments reflect a general concern about the coffer dike and about the fact that the Red River is slowly encroaching into the downtown area. In fact, it was speculated at the group meeting that all of Main Street will be in the river within the next couple of decades due to erosion. This all severely limits growth, added to the fact that the American border also poses a boundary of sorts to growth on another side of town.

One other person stated their concern about the changing landscape with the addition of so many dikes on the Red River Basin landscape. He said… 'Everyone has dikes now, so water will be shuffled into a smaller space.' He saw this as creating further vulnerability to flood.

The use of dikes as a mitigation measure was raised in the focus group meeting, and essentially confirmed the results of interviews which suggested a high level of dependence on the dike to ensure security. One person noted 'We are inside the dike so we are protected.' Another said that if the dike should break, 'we can't get out fast enough.'

In discussing vulnerability reduction, several residents noted that the lift station has now been placed inside the town dike rather than outside the dike. The lift station pumps storm water into the river and prevents sewer back-up; because it was previously outside the dike, sewer back up was a problem in floods. This was rectified since 1997.

Local emergency response

'It puts the mind at ease…a core of people (fire and ambulance) can arrive in minutes…a nucleus of people to help.'

Other issues related to vulnerability reduction emerged from photo reviews with individual residents. Nonstructural measures were discussed, such as the effectiveness of the emergency response personnel – i.e., fire and ambulance – in 1997. One participant noted how well they performed in 1997; emergency personnel had quickly added three or four feet of sandbags to shore up the town dike. People in the town appear to have immense respect and gratitude for the service providers. Below is a sampling of what was said about them in the context of flood events.

'In 1997 these people stayed within the dike during the flood and stayed at night… They patrolled 10-15 kilometers a night - the dike (length) - and tested it to see if there were soft/weak spots.'

About the photo of the fire hall (Figure 6.35), one man said, 'it puts the mind at ease…a core of people (fire and ambulance) can arrive in minutes…a nucleus of people to help.' More than six of the interviewees made specific reference to the existence of the fire hall, and the fire and ambulance staff, as a source of assurance in an emergency such as flood. A woman noted that her photo of the fire hall 'represents vigilance regarding flood, and protection from hazard such as fire.'

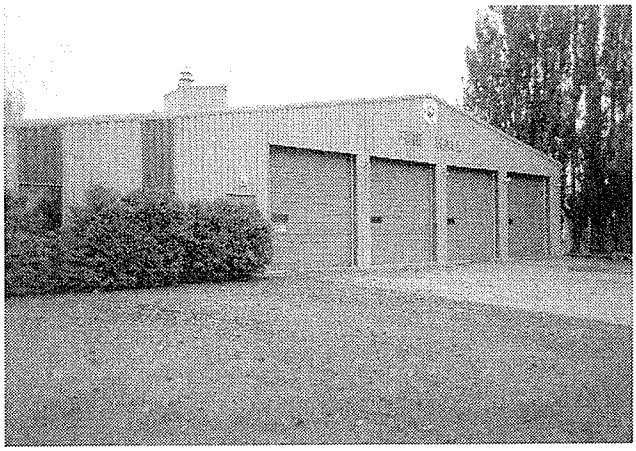

Figure 6.35 – Fire Hall and Emergency Services

Participants described that in 1997 MEMO operations ran out of the fire hall in town and it was here that decisions were made during the flood. One person shared that in future MEMO will be upstairs in the historic town hall, a change made due to the fact that this old building does have solid cement walls and floors with a brick veneer as well as three stories, making it less vulnerable to flooding than some other newer buildings in town.

Several respondents also discussed that the Province is working with municipalities and towns to ensure that there is local training in emergency response from Manitoba's Emergency Management Organization (MEMO). This has in fact been mandated since the 1997 flood occurred.

As for the response of individual community members to floods, one person observed: 'People see flood as a nuisance. They are concerned about 'when can I get back (into my home)?' There is 'little fear of damage to property or self.' They further explained that evacuation of the town - from their perspective - has more to do with the fact that with high water the highways are covered than with any concern about actual flood risk.

One person captured two key community level capacities related to the alleviation of feelings of vulnerability that seemed to be shared by most participants- the dike and emergency response capabilities housed in town. She had this to say: '(The dike) is my protection, supplemented by people watching and being diligent.'

Cemetery flooding

'The dike is in front of the cemetery. It floods every time there is a flood. From the east (side) it still floods. People are upset about this. There is a bit of a dike but it is not high enough'

The issue of dike construction is particularly poignant for some residents as it relates to the Emerson cemetery (Figure 6.36). One person focused on how the cemetery has been protected by a gravel dike (that looks like a road in the photo). The back of the photo also shows a further protective dike at the back of the

Figure 6.36 – Cemetery and dike

cemetery which was built by the community in 1973. Two informants noted that the cemetery contains graves of soldiers; hence, the white crosses.

One resident was quite distressed, however, at the failure of the dike to sufficiently protect the cemetery in 1997. She has family members buried there and felt that there has not been sufficient attention to the protection of the cemetery. In the focus group she raised this issue and was told that the cemetery flooded in 1997 because of some inaction taken by the Council, essentially an oversight. She continued to maintain that the cemetery is often very excessively wet. She claimed the following: 'the dike is in front of the cemetery. It floods every time there is a flood. From the east (side) it still floods. People are upset about this. There is a bit of a dike but it is not high enough.'

6.4.9 Local knowledge and the river

'Without it we wouldn't be here, flood or no flood'

The dominance of the Red River in people's lives was evident in reviewing photographs and during discussions. The focus group discussed this quite extensively when a photo of the river was shown. The group verified that there is a strong 'attachment' to the river. Some noted pragmatic features of the river such as its role as a source of water, and there was commentary about concern for water supply in dry years, a reference to the history of transportation on the river, and discussion of the river as a reason this town site was chosen.

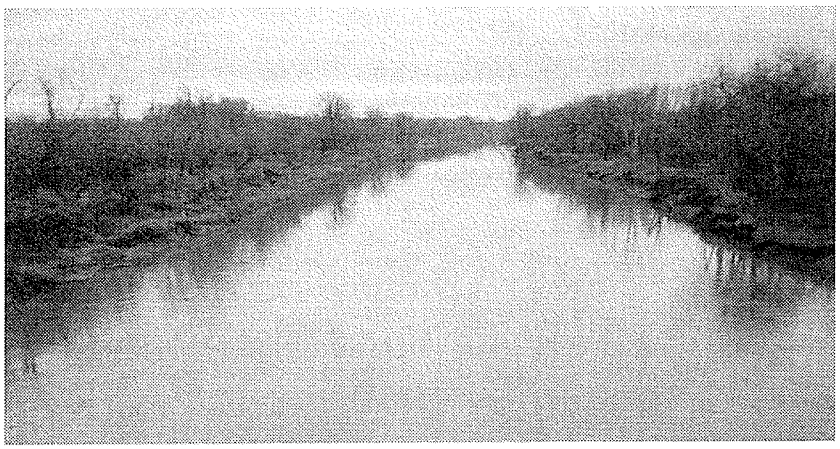

Figure 6.37 – Red River erosion

Another resident reflected on the less tangible meaning of the river in her life, noting 'The river has always been a part of my life growing up; it is part of the life of this town; it runs through the middle.'

A discussion emerged on how the river has been changing in recent decades. It was noted that it used to be high in the spring, and would recede for the summer. This pattern has changed. Some members of the group attributed this to the increasingly efficient draining of farmland upstream, observing that, in general 'the river fluctuates more.' One person commented on how a three or four inch rain can now raise the river six to ten feet in a couple of days. The river cannot be used in the same way as in the past when a diving board was on the river. Now it is too dangerous.

Residents also talked about the changing character of the river and the riparian areas, observing that there is much more erosion (Figure 6.37) than several decades ago with subsequent loss of many trees, particularly elm trees. Many that remain are dying.

The residents of Emerson made it clear that they have their own ways of assessing risk from flooding or from high water generally, through using markers on the local landscape with which they have become familiar over many years.

Figure 6.38 – Trestle bridge

One photo of the river caused a participant to reflect 'we look to the river in winter and in spring to judge what will happen.' Participants took photos of the bridge in town (Figures 6.38 and 6.39), and one observed: 'this view is taken from the new bridge on 75 highway and is how people judge how high the water is…by brick rows on the center pier (Figure 6.39). This is not the (water) measure of the Province.' The Province uses an electrical gauge on the river.

Figure 6.39 – Emerson bridge

During the focus group there was also discussion about how local people use the bridge as a gauge of river conditions. They were cognizant that residents tend to use local knowledge to make judgments about river behavior and flood risk .One participant noted in the group 'you are always watching the river, you just do it!' Others responded with much laughter and agreement. It appeared a point of bonding among locals. Another quote was 'people talk about how many bricks the water level rose' (that is, to what row the water has reached on the trestle bridge's middle pier). People shared that residents talk about the water height as they exchange news at the coffee shop and the New Horizons Center. With a pointed reference to the Province's technical experts, one man said, again to much laughter: 'You don't need someone with five years of university to tell you the water is getting higher.' Another person noted the extremes of river behavior, stating that one year when it was too dry it also became the talk of the town. Residents claimed, however, that this past summer the water system could not keep up with all the rain that fell. The unpredictability of the weather became a theme in group discussions.

One resident shot a photo of a telephone pole outside his home which had a ribbon on it to show how high the water was expected to go if the town dike had been breached in 1997. It would have meant three or four feet of water in his home. The interviewee did not know who had placed the ribbon there while he was evacuated. This is a constant reminder of the risk posed by Red River flooding. When he returned home after the 1997 flood, in addition to the ribbon was a bunch of balloons, a sentimental notion according to him, but a symbol of victory nonetheless.

6.4.10 Government failures from the community perspective

The community members involved with this project had some comments about government, and particularly the provincial government with respect to support for the community and issues related to flood risk reduction.

For example one resident took a photo depicting a life-lease manor (Figure 6.40) for elderly people. The initial plan was to have these available by a 1997 deadline so that no school taxes would need to be paid, according to a provincial government policy at the time. However, the flood event resulted in postponement of completion until 1998 and the Conservative provincial government at the time changed the exemption rule. One community member said of this situation that it was good that the life-lease manor still was completed after the flood but the town had got 'shafted by the Conservative government regarding the changed policy.' One person claimed it costs the town $7,000.00 a year. Of difficulties faced by small towns, he claimed: 'Living in a small community is an uphill battle…if we ask for meetings it is hard to get persons

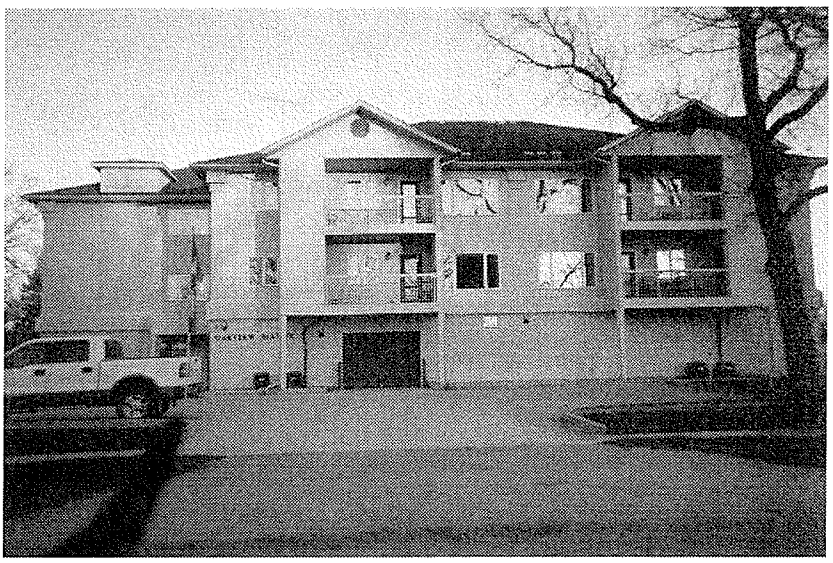

Figure 6.40 – Life-lease manor

necessary to make decisions to the meeting.'

When asked about how residents believe better decisions could be made to reduce flood vulnerability locally, one participant said 'There is a problem with all the "multi-agency"...there is always someone who thinks they are the thread holding things together... (this) results in conflict...there is a need for some person (who can say) the "buck stops here"... (We) don't need questioning by multiple agencies so that nothing (actually) gets done.'

This person also went on to observe: 'There are costs if you do things, but also costs if nothing is done (with regard to flood vulnerability).'

6.4.11 Emerson: reflections on flood vulnerability

Discussions of the photos by residents yielded some general observations of how residents view their community's vulnerability to flood, particularly as it relates to their visions of the community's future. There was a split among residents in relation to the town dike. Some felt it has proven itself sufficient given recent flood events and that flood threat to the town itself has essentially been dealt with (although evacuations may well be common in periods of high water).

'(We) alleviated vulnerability by the dike.'

'If a flood occurs, it will be dealt with... it will be an inconvenience but will be dealt with.'

More prevalent however, was a sense that vulnerability of the town is tied heavily to the dike being both adequately high, well-constructed (an issue with one section of the dike particularly, i.e., the coffer section), and maintained appropriately. It was obvious that some people were also more aware than others of, for instance, the dike maintenance or construction issues.

There was a sense within the community that issues related to American-Canadian relations make people feel more vulnerable. Vulnerability was from two primary sources. First, the social networks and relations with nearby American communities have been eroded, particularly given increased border security since the September 11th 2001 terrorist attacks in New York. This has limited the opportunities for cross border connectedness and dialogue at local levels. The fact that water issues are now discussed at higher political levels almost exclusively has also altered the social context for cross border flood management. The Devil's Lake diversion, with the potential to send both water and biotic contamination into the Canadian portion of the Red River also contributes to feelings of vulnerability. 'We have given up control over water levels; they are potentially controlled by a foreign government.' In general, alterations to the landscape south of the border also raised concerns about higher water levels in future. '... how much extra depth will go up due to levees / dikes in U.S? Consider U.S. flood proofing structures... how will they alter the levels of water in Emerson?'

Overall, residents of Emerson felt vulnerable from a myriad of sources that were peripherally related to flood risk. These were stressors facing rural Manitoban communities such as depopulation, aging populations, changes in retirement patterns, closing businesses and lack of new economic opportunities. It made several participants note that if the town should flood it might well destroy the town due to compounding vulnerabilities. In other words, vulnerability to flood is compounded by pre-existing social and economic sources of vulnerability.

In addition, loss of tax revenues compromises the community's capacity to adopt some measures that might well reduce their flood vulnerability such as riverbank stabilization 'There isn't enough money to do some (mitigation) schemes. For example, we need to stabilize the riverbank. The river has less capacity. Water levels go up and down, are unstable and cause erosion.'

Linked to this were social processes for decision-making in which residents were minimally involved (frequently by choice) with a leadership that does not have a lot of available

resources. This makes the town extremely reliant on senior government direction in all matters related to flood. And once again, there is comfort in complacency. 'People don't take time to ask (questions) unless something happens.'

When residents discuss a vision for the community, the focus is on the need to bring new people and businesses to the community. This is seen as a challenge for social and economic reasons more than flood-related matters. Thus some participants stated goals for the town which included returning to days of former prosperity- perhaps through development of historic buildings and sites to lure tourists.

6.5 Discussion: Living with the risk in both communities

Residents of communities like Ste. Agathe and Emerson live with a perpetual flood risk. When residents reviewed photographs of what they value within their community, and objects related to flood vulnerability, it is not surprising then that a variety of issues related to flood risk were revealed. The results of the photography research showed that, in addition to the obvious vulnerability posed by the physical threat of flood in a floodplain, there are both other external and internal sources of social vulnerability that were revealed in participants' discussions of the photographs that they took of their communities.

Photos revealed that residents believe that physical risk is best dealt with through diking the community; however, some residents were clearly cognizant of the fact that dikes cannot be merely constructed and then ignored. Several dike-related issues were seen as problems from the perspective of community members in the two communities, and as potential contributors to vulnerability as long as they go unaddressed.

For example, residents' concern that part of the Ste. Agathe dike was insufficient, which was based upon local experiences over decades of floods, was invalidated by authorities when the computer generated models of flood scenarios did not confirm that these concerns were warranted. This attitude by government authorities confirmed the dominance of the oft-criticized stance prevalent in Western culture that technology should preferentially be the

means to protect us from natural hazards (Mileti, 1999; Stefanovic, 2000; Hewitt, 1983). The perspective of the agency in authority – reflecting many of the government institutional beliefs and values discussed in Chapter 4 - was that the technological interpretation of the level of risk was the 'right' one. This attitude confirmed the perspective that values and ethical stances have a place in natural hazard mitigation (Beatley, 1997; Mileti, 1999; Stefanovic, 2000) even though authorities and government agencies appear to largely reject this notion (Beatley, 1997).

In addition to adopting a very narrow interpretation of how to mitigate risk, government handling of the Ste. Agathe dike issue was contrary to sustainable hazard management practices (Tobin, 1999; Werrity, 2006). The authorities undermined community independence, local interpretations of vulnerability and the notion of broad cooperation among stakeholders - all seen as key components to vulnerability reduction (Mileti. 1999). Burn (1999a), reporting on community consultations after the 1997 flood, noted residents' dissatisfaction with how local knowledge was dismissed by authorities and recommended that greater effort be made towards utilizing local knowledge in future. Such disregard disempowers communities. In the Ste. Agathe case, community ideologies, and attitudes about the dike, were legitimately based in part on past experience with floods. Given that the hazard literature suggests that probably the greatest factor affecting perception of risk is past experience (Laska, 1990), disregard for community flood experiences serves to minimize the level of risk, hardly a sound practice in a flood zone. Also, the community desire to translate their past experience into action (i.e., improving the dike) is precisely the type of adaptive response to a hazard that is touted in the literature (Tobin and Montz, 1997; Yodmani, 2001). The application of such experience failed due to a lack of social organizational capacities within the Basin to encourage it. The inability of the community to engage effectively in evaluating and mitigating the current and future state of local vulnerability due to institutional inflexibilities is particularly problematic in creating community resilience to flood. That ability to convert experience into knowledge is a social variable that increases resilience to hazard. In fact, vulnerability frameworks are thought to be greatly enhanced by the inclusion of local interpretations of flood events (Blaikie et al., 1994).

Another dike-related issue impacting vulnerability emerged in reviewing photos of the Emerson town dike. Various weaknesses were pointed out by research participants, mostly related to construction and maintenance. Yet residents were uncertain who has responsibility to take care of such issues, and said there were insufficient resources at a local level. The lack of adequate arrangements for assigning and paying for such key vulnerability reduction responsibilities suggests there has been inadequate assessment of vulnerabilities related to the dike. One of the criteria used in vulnerability assessment relates to the importance of clarifying how money and appropriate resources will be provided to achieve mitigation objectives (Jones and Shrubsole, 2001).

This reluctance to critique technologically-based mitigation efforts like town dikes, or even the floodway expansion within the Basin, is also a flaw in local approaches to vulnerability reduction. The excessive focus on the benefits rather than costs of structural mitigation projects (especially costs to communities south of the floodway) is a not uncommon 'critical flaw' in planning (Bogard, 1988).

In terms of other indicators of vulnerability, the community findings illustrated the under-utilization of local river knowledge in flood management and mitigation. Photos taken by residents in both communities highlighted their deep attachment to the river, and their sensitivity to changes in river behavior. Often the photos revealed that residents in both communities carefully observe changes in water levels and have landmarks such as the town bridges to help 'measure' water height. They can then relate this variable to past experience and make preparations for a flood if necessary. This valuable knowledge is part of local lore and helps local residents to perceive the risk of flooding regardless of the actions or communications of authorities. In fact, it became evident in this research that there is some struggle between community knowledge and expert technical knowledge. Ideally, planning for a hazard should incorporate both and view them as complementary. In the Basin this has not yet transpired in these communities.

There were many sources of vulnerability within the communities studied, often linked to external factors that contribute to insecurity in the face of a hazard. Several were evident in

photographs and ensuing discussions with residents. More specifically there was evidence of barriers to development of capacities to anticipate, cope with, resist and recover from floods.

In Emerson, photos revealed a community investing somewhat more community energy on attempting to capitalize on historic assets, and creating business or economic opportunity than in pursuing further or improved flood mitigation. However, it is also important not to view this too negatively as context is revelatory. For example, the photos revealed a story of a community which has undergone some significant social and economic change in recent decades with unfortunate changes within the local population and business environment, and reduced employment. In fact both communities studied are attempting to adjust to new economic realities, one of which is a changing countryside that is becoming a 'playground' for urban dwellers (Epp and Whitson, 2001). Another stress is that global market forces resulting in low commodity prices are threatening the viability of small agricultural producers that used to support these towns and posing serious challenges to 'community resiliency' (Epp and Whitson, 2001). The development of historic properties in Emerson, and the campground and park in Ste. Agathe, are attempts to capture the growing tourist market as traditional rural economy declines (Ilbery, 1998; Epp and Whitson, 2001; Lawrence, Knuttila, and Gray, 2001) and new sources of income are needed within communities. As the rural literature indicates (Ilbery,1998; Epp and Whitson, 2001) these Basin communities are not alone in their struggles; the added element of flood risk to already vulnerable communities - one that results in compounding vulnerabilities - makes the urgency to engage the community in dialogue about how to meet these challenges of paramount importance. Such compounding vulnerabilities increase the likelihood of very negative psychosocial impacts should another large magnitude flood occur, such as potentially serious mental health and physical health impacts for victims, and significant economic and other problems for affected communities.

Literature confirms the instinctual belief that diminished livelihood options do in fact increase general vulnerability (Blaikie et al., 1994; SEI, 2001). Similarly, Mileti (1999) speaks of the existence of diverse root causes of disasters, like the erosion of social capital, which was a factor in both Basin communities studied. Vulnerability perspectives warn that

multiple factors which weaken community resources are contributors to vulnerability (Jones and Shrubsole, 2001; Yodmani, 2001), and lessen community capacity to handle a variety of hazards, including flood.

Communities such as Ste. Agathe and Emerson, of which there are many on the Prairie, already are engaged in a struggle related to the 'deterioration of community spirit' (Harder, 2001) a condition which can befall declining rural communities in the face of family departures and business loss. As seen in this research, the flood of 1997 resulted in the loss of several families in Ste. Agathe; this was a loss of social assets the community could ill-afford given rural stress in the current economic and political climate. Furthermore, technological change has permitted people to become more mobile (Ramsey and Everitt, 2001) and to commute between rural and urban environments for work or play, and to use services not housed within their own community. This has contributed to the out-migration of young people which is, in turn, part of the erosion of local communities (Ilbery, 1998). When it comes to declining rural populations Epp and Whitson (2001) suggest that at issue is whether there will be enough of a 'successor generation' to sustain these communities. It is evident that the perspectives and experiences of community participants in this research reflect the broader issues facing rural communities in Canada (and elsewhere) and are essential to understanding issues that threaten community resiliency.

One might also speculate that developing new avenues of attracting people and business does seem perhaps a more achievable goal from residents' perspectives, and perhaps more importantly, achievable within a nearer time frame. Several senior residents in Emerson simply thought there would not be a flood that would breach the diking system in the foreseeable future. In this case personal experience in recent decades has confirmed the security of the town behind the dike. With less concern about physical security, some people are understandably more concerned with creating social security by addressing other important community issues. It might also be possible to speculate that, given people's disengagement from flood management issues, they would rather put their personal efforts in addressing issues over which they may feel they have a semblance of control – such as

business and development ventures - than over flood events about which there is a high level of uncertainty.

Similarly, Ste. Agathe photos revealed that growth is seen as a necessity for the future of the community. In reviewing photos taken to depict losses of homes and residents in 1997, it was evident in comments made by residents that declines in population have raised alarm about the community's future. Hence, there were many photos devoted to new initiatives hoping to increase the appeal of the community - the new gas bar and convenience store, industrial park, residential development, and the Flood Interpretive Center. With regard to the Interpretive Center, it was also evident during interviews and focus groups with members of Ste. Agathe that some residents have a vision not only of community growth but also one where the Center itself, an adaptive response to flood hazard, helps to lower intergenerational vulnerability to flood by educating Basin residents about flood risk.

There were also photos of the river where it was depicted as a resource that could be used to 'sell' the community, provided the flood risk was placed in proper context. Furthermore, Ste. Agathe has experienced successes with such initiatives (e.g., the new subdivision). This study also showed that while success is discernable with regard to these social goals, there has been less success in working with for example, WCIS, to address dike issues or the floodway expansion conflict. Once again, perhaps the community feels more empowered to make decisions related to community growth than those related to flood mitigation.

This research in the Basin revealed how for some rural communities the changing community fabric is seen as a more immediate concern. It could be speculated that if communities such as Emerson and Ste. Agathe can reverse some of the decline in their communities and improve the quality of social assets and social capital, it could ultimately increase resilience - including resilience to floods. Capacity to recover from a flood event might well be improved by a more youthful and exuberant social and business climate.

Review of the photos also depicted a high level of attachment, quality of life, and social capital within both communities, and high levels of volunteerism and cooperation related to

recreation and other activities. In fact, the nature of such pro-social behaviors is one of the salient cultural characteristics that reduce vulnerability to hazards (Oliver-Smith, 1995; Tierney et al., 2001). In Ste. Agathe particularly, goals set by the SAEDC illustrated significant social capacity to address community scale problems. These are all important attitudinal and motivational capacities at the local level. Local capacities are significant in relieving vulnerabilities to potential hazards (Wates, 2000).

However, there were other sources of attitudinal / motivational vulnerability (as opposed to capacity) that were revealed during the photography exercise. The most prevalent was the belief that mitigation decisions are to be largely delegated to agencies external to the community, and the accompanying complacency and dependency. In fact, expectations of institutions are another factor that influences vulnerability (Tierney et al., 2001) and is particularly problematic when expectations absolve local communities of responsibility for flood management and mitigation. As seen in comments made during interviews, people in both communities believed that the influence of their community over flood management decision making was not highly significant, although the SAEDC played some part in representing community interests. Some residents in both communities expressed a degree of helplessness to oppose the processes for mitigation decision-making set up by the Province as seen in the data. Similarly, others also expressed helplessness to deal with cross-border flood-related concerns.

However, community beliefs and values which transfer responsibility and accountability to authorities and government institutions must be able to be rationalized within the existing context. With regard to the community willingness to transfer responsibility and accountability to authorities and external government agencies, literature on community beliefs / values and decision making would suggest that the power structures and social and economic processes in these communities encourage such responses (Rokeach, 1973). Certainly, the propensity for government to adopt a command and control approach during floods, as in 1997 (Haque et al., 2003), and the broad based compensation provided to victims afterwards also reinforces that vulnerability reduction is more the responsibility of government than the community. In addition, other research into the relationship between

values and decision making shows that it is not uncommon for individuals to surrender responsibility for difficult decisions to others because 'freedom of choice' can be difficult due to the anxiety and the uncertainty that some decisions can provoke (Fenton et al., 2001). Given this perspective, it is plausible that the complex and serious nature of flood mitigation decisions, in conjunction with the attitudes exhibited by government institutions, make it understandable that communities might opt not to fight for local control over mitigation. This study suggests that at this point in time there are not sufficient incentives - and significant disincentives - to community level planning to reduce flood vulnerability. Such realities are constraining community level vulnerability reduction capacities and are also permitting institutional responses to flood related issues to dominate, regardless of the limits to such a narrow technologically-based approach (Stefanovic, 2000).

6.5.1 Government provision of hazard mitigation and the welfare state in Canada

The previous discussions of the community findings in this research have shown a myriad of reasons that vulnerability has been socially constructed within the Red River Basin. The government role in the attenuation of flood vulnerability through the nature of its relations with Basin communities, as well as the nature of Canadian beliefs about government responsibility and entitlement to both assistance and compensation have been implicated in vulnerability creation. It is however important to place the current role of government in hazard mitigation in a broader historical context. Specifically, the creation of the welfare state in Canada has impacted the expectations of Canadians with regard to the role of government in assuring security to residents.

Reflecting back on the political climate of the late 1800's, Canada - like most western countries - was characterized by an enfranchised citizenry who began to feel empowered to vote for government policies that improved the quality of their lives. Simultaneously there were strong proponents of laissez-faire economics which emphasized minimal interference with the market place - arguably to the benefit of all. A philosophical conflict ensued that pitted those in favor of independence in the marketplace against those who wanted social change to assist the less socially and economically fortunate in society. Ultimately the

intervention of the state began to be seen as increasingly essential to preserving the freedom of the individual in modern society (Turner, 1981).

As a result of various social movements in the early decades of the 20th century, and particularly the impact of the Depression in the early 1930's, social policy changed significantly as Canada began to enact significant social welfare measures. This was evident through the creation of old age pensions, and health and unemployment insurance. During World War II, per the Atlantic Charter, Canadian society was broadly seen as obliged to provide for those needs that were seen as beyond the control of individuals; social security became a 'right' (Turner, 1981). Successive decades saw major social legislation that ultimately established social welfare as a necessary institution in Canadian society to be broadly considered and included in broader planning (Turner, 1981). With this, there evolved a complex of bureaucratic agencies and a general reliance on bureaucratic specialists by political decision-makers.

The welfare state, then, in essence implied an organized power which aimed, among other things, to protect citizens against universal risks that would otherwise lead to crises (Turner, 1981) for individuals or collectives. It also allowed for income redistribution to occur in the event that some members of society had to be provided for should 'hard times' befall them; there was now a social vehicle which allowed resources to flow to the needy from other sectors of society (often the taxpayer).

However, the nature of the security provided for by the welfare state has continued to evolve in Canada and elsewhere. In more recent years, western democracies have experienced a shift to modify the nature of security provision so it is not limited to the public sector; rather social welfare provision is now more likely to be distributed between the private and public sectors (Denney, 2005). As the perceived need for welfare continues to increase within many western societies (Denney, 2005), the political demand for accountability, efficiency, and 'value for money spent' has also risen. Simultaneously, global market forces have shifted Western ideology to a market-driven focus with the dominant issue in public policy relating to capital accumulation (Lawrence, Knuttila, and Gray, 2001). Breaking with earlier

ideology in Canada, there is now higher priority to encourage people in 'self-responsibility' than was the case in older social policies following the Second World War (Denny, 2005). In rural regions particularly, there has been a new ideology of 'self-help' with state governments less likely to assist rural towns (Lawrence et al., 2001). This decentralization creates an appearance of 'power-sharing' but in actuality protects the economic resources of the state and shifts blame for economic (and infrastructure) deterioration to the local level (Ramp and Koc, 2001).

This partial devolution of some of the key components of the welfare state, and the downloading of responsibilities to local governments and communities, is a significant qualitative change in how risks have been managed in Canada. In the context of hazards such as flood this has implications for how citizens and government conceptualize their roles in mitigating threats from hazards like floods. In examining flood hazard in Manitoba particularly, it is possible to see that the institution of the welfare state has in all likelihood been influential in the evolution of the responses of both government (i.e., government bureaucracies) and citizens to floods. Within the province of Manitoba the history of past flood events reflects the broader Canadian social evolution from small largely self-sufficient rural communities towards a complex welfare state which moderates flood impacts. Prior to 1950, Manitobans historically managed their own risk and responded to flood events through utilizing their own personal resources or that of their local community. However, the droughts of the 1930's resulted in the creation of a first formal legislative response to soil and water conservation problems by the federal government; this was through the Prairie Farm Rehabilitation Act (PFRA) and its programs. The government was increasingly becoming involved in the management of water on the Canadian landscape, and was intervening in matters of risk to communities and individuals.

Then, in 1950 - for the first time in nearly a century - the Red River Valley had to cope with a major flood (Bumsted, 1993) and the City of Winnipeg was at grave risk. The fear and devastation wrought by the 1950 flood to Winnipeg and surrounding communities was pivotal in the use of an initial Canadian federal disaster assistance arrangement (Bumsted, 1993) which began the formalization and institutionalization of federal responsibilities to

assist in disaster response and recovery for victims of a Canadian disaster. It was a precursor to the existing Disaster and Financial Assistance Arrangement (DFAA), established in 1970 (Hwacha, 2005), which provides for federal assistance to the provinces (i.e., a cost-shared arrangement) based upon a sliding scale, with federal contributions rising with disaster expenditures. Essentially the arrangement allows the federal government to assist in disaster response and recovery when a province cannot reasonably handle it on their own.

Another consequence of the 1950 flood, and government interventionist ideology, was that the key provincial government response to the heightened sense of flood risk was to embark over the next years in three large structural works to mitigate flood, including the floodway around the City of Winnipeg. In essence, the centralized governments took control over flood mitigation from local levels. Given this history it is understandable that citizens living within the broader Canadian welfare state, and within Manitoba, have since come to view the government as responsible to prevent and mitigate flood risk. This is a significant departure from how risk mitigation was viewed prior to the institutionalization of risk in Canada and the intervention of government to ensure security from risk for residents. Government agencies, using engineering and natural science expertise, have focused on structural solutions to flooding that are outside of the knowledge and experience of local people, effectively eliminating them from participation in mitigation decision-making in most instances, and allowing them some abrogation of responsibility for their own properties flooding. Furthermore, when risks cannot be fully mitigated and properties have flooded, government flood assistance has reinforced citizens' expectations of compensation and allowed, in many cases, for continued development in flood hazard areas (Ogrodnik, 1984). The cycle of vulnerability creation continues.

It is not surprising in this social and political context that even as recently as the 1997 flood, residents of the Red River Basin expected that government would take care of them, that government compensation for damages would flow, and believed that their participation in flood vulnerability reduction was not required. In essence, the social welfare machine run by elite bureaucracies has undermined citizen involvement in vulnerability reduction and helped in creating dependency.

In addition, the devolution of some aspects of the welfare state, as Canadian senior governments try to pass on more social services to the private sector and more social responsibilities to local governments - to curb expenses and demands on government resources - has implications for flood mitigation responsibilities. While there are attempts by authorities to more actively involve local communities, municipal governments, and residents in mitigating (and paying to mitigate) local risks, and certainly discourse about offloading responsibility, it is a serious challenge to the rights and expectations that have evolved over the last two centuries of social history in Canada. Given this, it is likely to be met with resistance.

Upon examination it seems that, rather than responsibility vacillating between government authorities and local communities, the more ideal model of responsibility for hazard mitigation rests in the notion of shared responsibility. The notion of shared responsibility is implicit in the hazard and disaster literature through reference to, for example, a need for 'integration' of social and technical perspectives in flood risk management (Brown and Damery, 2002), or 'sustainable flood management' which assigns key roles to both individuals / communities and responsible authorities in focusing on vulnerability reduction (Werrity, 2005). More explicitly, Tobin and Montz (1997) conclude that effective policy implementation for hazard mitigation is most likely to be achieved through a combination of national directives as well as detailed local studies. They iterate the need for structural changes to society to effectively reduce vulnerability. The other rarely discussed reality is that some risks will exist because political decision-makers will have decided that a risk is required to attain a socially desirable objective (Tobin and Montz, 1997). Clearly, risks should be negotiated rather than simply imposed on a group within society; a shared model for flood mitigation decision-making would explicitly mandate such negotiations by the various stakeholders.

6.6 Commentary on the use of photography to elicit community perspectives and values

The photograph by its very nature is 'of' the past. Yet it is also of the present. It preserves a fragment of the past that is transported in apparent entirety to the present- the 'there-then' becomes the 'here-now'.

(Edward, 1992 in Parker, 2005)

The use of photography in exploring people's beliefs and values about flood risk proved to be extremely effective in this research in several ways. First it was possible for community residents to capture abstract notions through tangible symbols. There were many examples of this - ranging from photos of children to local leaders, and which illustrated important concepts such as partnership, leadership, legacy, and community attachment. The church in Ste. Agathe alone was a medium for people to explore various ideas - mutual support, perseverance, faith, and identity. Secondly, photos were also able to capture the history of the area and its relevance to people's attachment to their communities through photos of old buildings, monuments, family homes, and cemeteries. These are the factors that keep people tied to communities repeatedly at risk from flooding. Photos also illustrated the relationship people have had historically with the river, and the attachment and their level of sensitivity to river behavior.

The photography exercise eloquently represented aspects of community flood vulnerability. Photos of empty lots conveyed a deep sense of loss – multiple losses- of family members, friends, family recreation areas, expropriated property, all due to the 1997 flood. It allowed a new way of 'knowing' the losses a community can sustain. It helped reveal how the community's past and present are linked, how flooding has played a part in the community identity, and how the community has come to understand the phenomenon of flooding. Photos of the town also prompted people to reflect on changes on the rural landscape that are unrelated to flooding such as loss of family farms, closing businesses, etc. but which all impact community resilience to any hazard. In Ste. Agathe, particularly, photos of new

housing and recreational developments displayed the community's hope and vision for the future.

The process of taking photographs had great value in and of itself largely because it required forethought and deliberateness. People had to choose what to shoot. The results indicated that community members thoughtfully considered those features of their communities that made them feel either more or less vulnerable. It was not uncommon to hear residents of both communities, in discussing the photos related to vulnerability, claim that they (or their community) really ought to be more involved in flood related issues. If they had not taken the time to reflect carefully on the issues, and the needs and priorities of their community, they might not have come to that realization. The process seemed to awaken perhaps a sense of concern or responsibility about community vulnerability. It was one vehicle to engage citizens in assessing the meaning of the flood risk to their communities.

There were also many practical flood management issues that were raised through photos of objects or places, some of which were not raised in the community surveys on flood vulnerability done earlier in the communities. For example in Emerson, photographs of the dike prompted discussions about maintenance and revealed that responsibility for maintenance is unclear. In both communities people also articulated weaknesses in their town's defenses, particularly town dikes, as a result of traveling around town and considering the flood risk.

The process of being actively engaged in taking photographs to represent their community and local vulnerability seemed empowering. Each person chose what to photograph, how to photograph it, and they were the ones who made sense out of the images. It was obvious that the photos triggered memories, and in the focus groups particularly, there was laughter, sadness and dispute. The photos did evoke emotion and prompted the telling of community 'stories.'

At a practical level there were several challenges in conducting this research. One was finding people willing to commit the time to the exercise. Thankfully, none of the

participants who took photos dropped out. The abstract nature of the task - to capture community values and vulnerability - was a challenge conceptually but one that all participants, regardless of age or education, met very successfully. It did require careful preparation and explanation on the part of the researcher. Another challenge was related to the large laminate poster given to each of the communities at the conclusion of the research; it was essentially a sample of photos and commentary about the community and flood vulnerability made by participants (refer to posters in Appendix H). Selection of photos and comments, to try to capture the essence of community beliefs and values, was difficult. It was important to do justice to the subject matter. It would not have been possible without the feedback of the members of the community. Finally, it was particularly gratifying to see that community members seemed proud of their contribution to the research, and seemed to feel that they had done a service to their communities and to future generations through their participation.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

Living with the ongoing threat of a flood is a reality for residents of the Red River Basin. Each large flood causes significant economic loss, personal and community hardship, and a flurry of activity to reduce vulnerability. However, the success of vulnerability reduction efforts in the Basin, as in many other regions of the world, has been increasingly scrutinized because of their limited success. The vulnerability approach to flood hazard emphasizes a need to look at broader conceptualizations of how communities become unsafe, including looking beyond the threat of exposure to investigate social sources of vulnerability. These sources of vulnerability are found in how people actually live within floodplains, and the social, economic and political processes that impact the choices they make to mitigate flood risk. This study looked at such processes through exploring how community and institutional perspectives and values are implicated in how flood vulnerability is addressed within the Basin. To that end, the following objectives were completed.

Objectives:

1. To review local mitigation decision-making processes, and describe the relative emphasis on structural and non-structural measures in the Red River Basin
2. To explore identified mitigation activities and decision-making processes within the context of vulnerability reduction approaches to hazard management
3. To describe community and institutional perspectives, values, and perceptions of vulnerability, and determine their roles in creating social vulnerability
4. To recommend how to counter some of the key sources of social vulnerability in the Red River Basin based on the findings from this research

Conclusions related to the first two objectives of this research are presented in Section 7.2. The comments there integrate the findings from all sources of data to reveal conclusions about how mitigation decisions are made, what and who influences the decisions, why

technical approaches are preferred, and problems with existing decision-making processes. Latter parts of this chapter reveal what conclusions may be drawn about sources of vulnerability that emerged from community and institutional values and perspectives in the Red River Basin. A framework that summarizes the progression of social vulnerability, based on findings of the research, is presented. Finally, four broad recommendations are made to aid in addressing social sources of vulnerability in this context.

7.2 Decision making to reduce flood vulnerability

7.2.1 Who decides?

In order to understand mitigation decisions in any context, it must be clear who has the authority and responsibility to make the mitigation decisions. The findings of this research on institutional and community perspectives and values showed that in the Red River Basin decision-making clearly lies in the hands of the Province and its agencies, with communities such as those studied having poorly developed means of influence, with local municipal government and occasionally local community groups to represent local interests (e.g., technical advisory groups; local advocacy groups). This finding means that local communities have limited access to power and limited ability to influence decision-making in a meaningful way, and reduced ability to develop local institutions to address flood risk (Blaikie et al., 1994). There is also little likelihood of changing vulnerability-creating perspectives and behaviors at a local level, as dependency on government will continue and vulnerability reduction will not be a local priority in the face of other pressing social and economic issues.

NGO's within the Basin are working to increase the influence of a wide range of stakeholders but have challenges with regard to secure funding. Attempts to influence the process under the leadership of the Province are generally not considered successful due in part to public participation processes that are perceived as flawed, and lack of resources and expertise at a local government level. There is also a significant belief among residents that decisions regarding which alternative mitigation projects to undertake are made in advance of

public participation processes. This implies that public participation activities are more symbolic than substantive.

That said, however, this research also revealed an important trend in public involvement in decision-making; namely, a significant increase in actual public participation opportunities in recent years. Public participation is increasingly legislated in order for some mitigation actions to proceed (such as the floodway expansion EIA process), forcing government agencies to formally engage in such processes even when, as discussed in earlier chapters, there is a lack of awareness of how to engage the public in a meaningful way.

While by all accounts in this research, including documentary evidence, public involvement in flood management decisions is increasing in the Red River Basin, it is not yet possible to state the decisions are made in true collaboration with communities through these public processes. Decisions still rest largely with authorities at provincial levels whose consultation with communities appears more dictated by political necessity than a firm belief that public participation is indeed an essential part of the best practices to address vulnerability. What is a very hopeful sign is that other agencies and organizations, some local and some international (e.g., International Red River Board; Red River Basin Commission), are committed to inclusive processes and are working to both encourage the necessary partnerships and influence as much as possible provincial interactions with local stakeholders. Similarly the early work on the Canadian national disaster mitigation strategy offers hope of a more collaborative and community based process of addressing multiple sources of vulnerability (Hwacha, 2004).

As seen in this research, some NGO's intimately involved in floodplain issues advocate for public involvement processes due in part to a different set of institutional values as compared to government agencies. Unlike these agencies, the NGO's saw the value in public participation beyond the fact that it was required through legislation or as a result of senior government directive. In responses to questions about idealized mitigation decision making processes, these key informants viewed such involvement as actually *essential* to improving vulnerability reduction efforts. This perspective sees local involvement as one mechanism to

enhance capacities to improve information flow and knowledge transfer to and from at-risk communities, and ultimately improve decisions made. This perspective on community and public involvement is commonly endorsed by groups and organizations that are actively committed to the notion of 'integrated flood management' (IFM). IFM, for instance, proposes that in viewing a river system as a complex set of natural and human interactions, 'participatory and transparent' approaches to decision making are a key element (WMO, 2003). This is consistent with a human ecology approach to flood hazard, which targets human understandings, decisions, and social contexts as fundamental to vulnerability reduction (Kates, 1971; Quarantelli, 1998a). This emerging belief about the importance of the public in reducing vulnerability is a significant attitude shift in the Basin seen among the select groups involved in this research. A question that remains for investigation in future research is if (and how) such groups might best transmit public participation values into decision-making processes that are currently dominated by bureaucratic institutions and processes.

This study further showed that top down decision making processes and assertion of authority by state agencies is a dominant feature of floodplain management in the Basin, and strongly imbedded within government institutions. In a society founded on democratic ideals, participatory processes that are somewhat illusory create a high level of mistrust towards authorities. They are also inconsistent with cooperative participatory values. In this study's findings, communities saw themselves as quite removed from decision making, and government agencies that are dominant institutions involved in floodplain issues appeared comfortable with, and dependent upon, their stated mandates and authority. Government personnel also appeared best able to execute their mandate using the tools of those traditional scientific disciplines in which most of them had been professionally educated , such as cost-benefit analysis, risk assessment (with probabilistic predictions) and various information management and modeling tools.

Two examples from this case study also illustrate that there is an under-appreciation for local knowledge about the Red River system at the community level when decisions are made. One example was evident in the accounts of Ste. Agathe residents as they discussed their

photographs of the Red River. They had several observations about how the river has behaved historically, and changes to the river and riparian areas as a result of recent flood events. Residents were very concerned about the implications of these changes for vulnerability, but reported they yet had not dialogued with authorities about their concerns in a meaningful way; this precludes their concerns being incorporated in floodplain management planning. In another example from this research, local people were frustrated that their concerns about the height of the new town dike were dismissed on the basis that the experts' models showed the height of the dike to be sufficient for a flood similar to that in 1997. This is in an area of town in which residents have distinct memories of water reaching markedly higher than the dike height during past floods. These interactions between provincial personnel and community people which fail to include local knowledge in decision-making have been evident in other jurisdictions as reported by Brown and Damery (2002); they claim that local information about river behavior under extreme conditions appears to be largely disregarded by official management institutions as they go about their business of protecting communities. The lack of attention to local conceptions and experience of risk may be explained in part by an institutional worldview that historically has seen local experiential knowledge as 'subjective' (and thereby 'lesser'), in contrast to the perceived 'scientific objectivity' employed by flood management institutions (Brown and Damery, 2002). The institutionalization of risk management common to Canada reinforces these perspectives, making community perceptions of risk subordinate to institutional views. However, the lack of inclusion of local knowledge in risk management seriously undermines the ability to reduce vulnerability and highlights the barriers that exist between bureaucracies and the people whose best interests they serve.

7.2.2 Balancing stakeholder interests in the Basin

When mitigation decisions are made, apart from *who* is involved in decision making, there is the question of *how* decisions must be made. This is a moral question (Beatley, 1999) in the sense that whose interests must be considered, and their relative weights or worth, must be identified in the process. Beatley (1999) identifies those whose interests are at stake as 'morally relevant' to the decision.

This research confirmed Beatley's (1999) contention that the clarification of whose interests are at stake in mitigation decision making, and how they ought to be evaluated, is a central and difficult issue in flood management in the Red River Basin. This was evident in community interviews, in discussing the floodway expansion in Ste. Agathe, and in relation to the problem of American floodwaters flowing into Canada at the border town of Emerson. People in the communities were well aware that there are problems with communication and negotiation related to the creation of flood hazard vulnerability in the Basin. In both cases there were power dynamics at the heart of the creation of vulnerability, a common finding (Blaikie et al., 1994) - with communities perceiving that the interests of the more politically and economically powerful interest groups typically dominate.

Also, as in many floodplains, there are many stakeholders in the Basin such as communities, individuals, a broader public whose interests are to be protected by government, and the urban center of Winnipeg which encompasses extensive economic interests. With regard to the floodway expansion, the Province has in essence (through its decision making) asserted that the interests of the broader 'public' are best protected through the expansion of the floodway even though the interests of some smaller communities south of the City are not fully protected. These communities may experience more flooding and more damage due to floodway operation. From an ethical viewpoint it may be reasoned that the expansion of the floodway and the protection it affords the City superseded concerns about equity between interest groups. Jones and Shrubsole (2001), in reviewing the vulnerability assessment literature, noted that it is unclear how vulnerability relates to such criteria as 'equity.' This research may offer some insight. At a community level there appeared to be an attitude of 'learned helplessness' on the part of some community participants in relation to their ability to have their concerns addressed, particularly when more powerful interests were in conflict with their own. 'Learned helplessness' is a psychological state in which people stop trying to solve a problem because they feel that no amount of effort will bring results (Hansson, Noulles and Bellovich, 1982). In essence, they feel they cannot get their needs addressed in this context. If this is the case, being proactive is very difficult and community level strategies need to be developed to counter these ingrained attitudes that amplify vulnerability. [Note that Hansson et al. (1979) use this term in a different hazard context, applying it to the

situation in which people stop trying to mitigate a hazard because they feel no amount of adjustment will be successful.]

Conceptually, the floodway expansion example illustrates a shifting of risk from a prosperous urban community to another community; specifically, flood risk is diminished in urban Winnipeg and increased in small rural communities to the south through the floodway expansion. It may be possible to view these communities as 'marginalized'- not perhaps in the absolute sense used by Blaikie et al., (1994) - but rather in the sense of communities that are (relatively speaking) economically and politically disadvantaged. That is, the smaller rural community with less economic and political power in contrast to the centralization of economic and political power in the City of Winnipeg. Such rural communities may be described as 'pushed out to the edge' (Kasperson and Kasperson, 2005).

The issue of the floodway expansion is an ethical dilemma that faced Provincial decision makers in selecting what mitigation actions to take but was not presented as such to the public. Even in conversations with some institutional representatives in this research, the decisions made on mitigating flood risk are not presented as 'judgments'; instead decisions are justified as impartial and value-free, based upon engineering analysis and application of the 'scientific method.' This notion that hazard mitigation decisions are value-free has been challenged (Beatley, 1999; Stefanovic, 2003). The findings of this research suggest the challenge is valid. There was significant variation in the types of strategies and processes that institutional respondents identified would be optimal to reduce vulnerability; these strategies appeared linked to the type of organization of which they were a part (e.g., provincial department versus NGO). This would support the contention that fundamental paradigms - including institutional values - may affect people's perceptions of which types of mitigation strategies to support (Stefanovic, 2003). One might, for example, expect an engineering consultant to advocate structural measures in reducing vulnerability, and minimize other nonstructural options.

This research also has shown that government and NGO personnel both admit that political goals and priorities actually influence and bias decision-making processes with regard to

flood mitigation. One of the dangers in this is that Basin residents who are not engaged in issues related to flooding will largely accept how government agencies have interpreted the problem because government is in control of information. As a consequence, urban Winnipeg residents and those in communities just south of the city may have very different interpretations of which decisions are 'best'- based on the information they are presented with. Control of information and power are viewed as somewhat synonymous in hazard management (Beatley, 1999). Control of information reinforces the Province's control over decision making, and can allow them to influence others towards political aims.

The federal government's role in floodplain and flood management in Manitoba is small; there were no changes to Canadian federal legislation arising from the 1997 flood (Halliday, 2003) even though the federal contribution to flood damage claims was sizable. The federal government appears merely supportive to the aims of the Province. In the data collected for this research, it is noteworthy that the role of the federal government in vulnerability reduction was only given passing mention by participants. Yet it would be supposed that the federal government has a legitimate role to play, particularly in the case of large flood mitigation measures like the floodway expansion, in part because federal monies are required for the project. With their role in the review process for the environmental assessment of large projects like the floodway, the federal government has the opportunity- and some might suggest obligation - to consider the needs of all citizens including those (like in the Rural Municipality of Ritchot) who may feel that they have been ignored in the provincial environmental assessment process. Yet they chose to have no separate federal environmental hearing on the floodway expansion, thereby validating participants' perspectives that the federal government is not proactively engaged in flood vulnerability decisions. The federal role of oversight could in theory help address moral conflicts and reduce bias in the decision making process.

As revealed in this study and elsewhere noted (IJC, 2000a), a sense of entitlement for compensation and restoration after a flood is a dominant perspective of communities and residents in the Basin. In 2006, as the floodway expansion is undertaken, community residents are very concerned about compensation for flooding- particularly artificial

flooding- as a result of floodway operation. The Province has enacted compensation legislation to essentially fill the perceived 'equity gap' between communities; that is, compensation will be offered if the protection of Winnipeg through floodway operation should harm other communities. From a vulnerability perspective, the city of Winnipeg gets a tangible structural measure to reduce the likelihood of damages, while the communities get a 'promise' i.e., of 'compensation.' Unfortunately, the promise of compensation at some later date is highly intangible, and residents are aware that compensation is easier to talk about than to actually provide, particularly after their experiences in 1997.

Compensation decisions and outcomes will also be dependent to some extent upon the goodwill of the government at some future time; this is not likely therefore to offer much reassurance. Comments made by participants in this study showed that political change is clearly a concern to community residents and members of various institutions; change in political party status and priorities can interfere with vulnerability reduction goals and activities, primarily through sudden government policy change and resource re-allocation to other areas of political oversight. Participants in this study were well aware of the propensity of governments to respond vigorously with policy changes in the aftermath of a disaster (Schneider, 1995; Tobin and Montz, 1997); they were also well aware that the political agenda is volatile and as time passes between flood events resources are likely to get re-allocated. Unstable political commitment to vulnerability reduction is a serious problem in managing flood hazard in the Basin.

7.2.3 Understanding technocratic approaches

The results of this research, seen in documents, key informant interviews, and comments by community residents has shown that government agencies assigned the social task of mitigating floods have a proclivity for traditional cost-benefit analyses, technical solutions, flood models, and for allocating resources into scientific investigation of, for example, hydrological and geographic conditions. Clearly, this research confirmed the view that technocratic approaches to vulnerability reduction, and more specifically structural measures, dominate within the Red River Basin. This has been a common pattern in Canada (Shrubsole,

2000) and elsewhere (Werrity, 2006). Earlier it was observed that government agencies with flood management mandates in the Basin, as elsewhere, are likely to consist largely of individuals trained in positivistic approaches within scientific or engineering disciplines, relying upon the tools of those professions. The consequence of this is that basic assumptions are made about how to structure the problem of flooding (Stefanovic, 2003); namely there is a tendency to structure the problem so that the solutions that are considered lend themselves to quantitative analysis. Understandably, these often are technical solutions. Such predominant paradigms are implicated in how problems of flooding are defined, data collected and interpreted, and how decisions are made (Beatley 1999; Stefanovic, 2003). They also limit the range of solutions to vulnerability reduction.

The surveys done in Emerson and Ste. Agathe, as well as interviews and focus groups with community residents also showed a preference for structural measures among local residents in the two small at-risk communities. The reason for this was evident as residents' perspectives were explored further, particularly in the light of photographs they took themselves. Specifically, many residents not only believed, but appeared to feel greatly reassured by the tangible symbol of, for example, a town dike. This sense of security, physical in nature, seemed highly valued by residents. For many residents involved in this study, it was the chief source of assurance of security. And conversely, known weaknesses in the town diking systems were a source of feelings of vulnerability for some residents. Interestingly, human attachment to features of the built environment has been described as a key feature of sustainable communities (Beatley and Manning, 1997); this study might suggest a need to further explore the role of structural measures, visible and tangible on a community landscape, in human perception of vulnerability, particularly when compared to people's perceptions of intangible flood mitigation measures such as development regulations or forecasting capacities.

While structural measures are highly valued, when it comes to the means of selecting mitigation activities, studied communities and some NGO's expressed less confidence in the use of cost benefit analysis and flood simulation models to represent the complexity of the problem. There seem to be limited tools available to integrate physical and social

assessments of vulnerability, so the emphasis remains on the former. In many instances residents were concerned that the intangibles like the stress of living through a flood (regardless of later compensation) could not be represented in the cost-benefit analysis.

In the example of conflict over the floodway expansion's potential to cause elevated water levels in small communities, the cost benefit analyses conducted by consultants must make certain assumptions about whose interests are paramount. In a cost benefit analysis it is essential to ask whose benefits and whose costs are figuring into the calculations, and how the notion of the 'greater good' should be interpreted. Other questions pertinent to understanding a cost benefit analysis of mitigation activity include: Are costs and benefits being calculated into the near, mid-term or long-term future? How is uncertainty being addressed, including issues like the potential impacts of climate change? Are the rights of future generations of Basin inhabitants being protected? The findings of this research into community priorities showed that community residents are very concerned about the futures of their communities but did not link those discussions with issues related to the need for flood vulnerability reduction; integrated vulnerability approaches to hazard management call for expanded community dialogue about community futures and priorities to be made within the context of mitigation discussions, not apart from it.

It is also noteworthy that nowhere in the data collected from all sources in this study was clear mention made of a method / tool other than cost benefit in selecting mitigation activities. Yet there are other methods such as multi criteria decision analysis which have some ability to deal more effectively with multiple interests, objectives and uncertainties (Morris-Oswald, 2001). There is a distinct lack of dialogue about if, and how, other means can be used to make decisions, including consensus among stakeholders. The issue is not that cost-benefit is a preferred method so much as that there seems to be little social discourse on alternative methods of evaluation of mitigation actions.

When the reasons for the abundant use and seeming preference for structural measures are considered, it is important to also consider the role that technical 'experts' play in decision making. As seen in the previous chapters there were concerns expressed by participants in

this study that residents do not understand technical jargon, are intimidated by 'expert' demeanor and language, and consequently often fail to challenge authority figures. Furthermore, when citizens attempt to raise concerns, their concerns are often inadequately addressed by officials who make frequent reference to numeric model outputs which, while relevant, are difficult to comprehend. The differences in the 'language' spoken by the two interest groups are considerable; hence, communication and mutual understanding are seriously compromised. Communication difficulties are compounded by people's difficulty evaluating expertise (Kasperson and Palmlund, 2005), and their need for technical means to act on and assess knowledge presented to them. Without those issues being addressed, technical discussions dominated by expert perspectives are likely to be a prevalent response to flood vulnerability.

It is also significant, as discussed elsewhere, that many participants in this study failed to attend meetings in their communities related to proposed mitigation measures, or were uncertain if such meetings had occurred. This limits the ability of citizens to criticize the analyses, and later the outcomes, under the supervision of bureaucratic agencies. Citizens disengage from the process, and have limited sense of responsibility as a result.

The importance of history in flood risk perception also cannot be overlooked in mitigation preference. There was a contrast in this study in how Ste. Agathe and Emerson residents viewed their vulnerability. Ste. Agathe residents- although they feel generally positive about the new town dike - have distinct memories of the recent flood which they recalled in interviews. In contrast, in Emerson, long-term residents stated their sense of vulnerability has been diminished since the construction of the town dike in the 1970's, compounded greatly by the dike's successes in subsequent floods. This is consistent with risk perception literature (Kates, 1971; Laska, 1990) which highlights that experiential variables like recency of hazard experiences and the nature (intensity) of those experiences do influence perception of risk. In the case of Emerson, experience with flooding was significantly reduced after construction of the town dike, reinforcing a positive attitude towards this mitigation measure. It is difficult to fault communities such as Emerson in these circumstances for placing great faith in such structural measures and giving minimal consideration to options that might

require a change in their own attitudes or behaviors. Citizens need to understand both the strength and weaknesses of measures to make informed decisions about how to reduce local vulnerability.

Stefanovic (2003) makes a cogent argument that perceptions and value judgments will affect notions of mitigation, and has been seen to prejudice decisions in favor of structural measures. Looking at the relationship between perception of cause and action (to mitigate), she asserts that if floods are primarily interpreted as 'acts of God' then there is a tendency to recommend structural mitigation strategies, to control this random event. The decision-maker seeks then to address the problem of flooding in the physical realm - i.e., alter the water movement - rather than the social realm - i.e., alter human behavior. In fact, such a perception, namely that causes of flooding are limited to geophysical processes - without consideration of human aspects of flood hazard exposure - was originally an impetus for the 'vulnerability approach' (Hewitt, 1983; Blaikie et al., 1994). This research would suggest that some institutional perspectives on flooding are still consistent with this thinking; however, it was heartening to see in this research that there are NGO's who are striving to help broaden perceptions of how risk is created in the floodplain, and are working with local governments and organizations..

7.2.4 Nonstructural measures and community perspectives

This study, through documentary and other evidence, has shown that there are some nonstructural measures that are highly valued by residents and other stakeholders. For example, communities recognize the importance of accurate forecasting and warning systems. The weakness in the utilization of these measures, cited in documents and in interviews, is the failure to communicate such information to citizens in a timely, understandable, and credible manner. This was seen most clearly in 1997 (IJC, 1997; Morris-Oswald, 2001). Government participants in this study, and comments made within documents following the 1997 flood, highlighted the need to rectify communication errors made in 1997 (IJC, 1997; IJC, 2000a). It is possible to conclude from this study that the use of nonstructural measures such as warning or emergency response systems- that are

dependent upon communication of information and development of trust between authorities and residents- would benefit from efforts into improving communication strategies in the Basin.

Residents interviewed did believe that local emergency plans, a nonstructural mitigation measure, were important to their communities. Some participants confirmed that emergency plans were in the process of being created in their communities. Yet these plans were still not fully complete, nor widely understood, at the community level eight years after the 1997 flood. They do not appear to have been given high priority by authorities, even though MEMO has been legislated to help communities develop them. The appreciation that residents - such as those in Emerson - have for emergency personnel reveals that people do feel less vulnerable knowing that there are resources devoted to emergency response locally. But few participants felt that they themselves had a role to play in emergency response in a flood event. Responsibility was left to others.

A serious institutional problem undermining community resilience that was evident in this research relates to the widely held belief - which was verified in 1997 - that government (federal and/or provincial) will offer compensation for flood damages to community residents as well as to their communities (e.g., for infrastructure repair). This encourages residents/communities in the perception that they need not become more actively involved in reducing their vulnerability. This has been observed elsewhere in the literature (Tobin and Montz, 1997). Beatley (1999) describes the issue related to individual and community beliefs about entitlements and expectations of government related to disaster assistance or mitigation benefits as a 'significant and ethical quandary' (p. 39). He notes that there have been a number of reports in the U.S. observing the emergence of a 'victim mentality' among residents impacted by hazard events. Community level beliefs that perpetuate this thinking do not serve to encourage residents to take responsibility for their own behaviors that increase risk, thus limiting vulnerability reduction capacities. The relationship between government policy and the perception of victimization among flooded residents (and the implications of such a relationship) is worthy of further investigation as a contributor to vulnerability. For communities to work with authorities towards a more cooperative shared

model of responsibility for vulnerability reduction (Haque and Burton, 2005) is unlikely when there are publicly held perceptions that communities are victims and government is the rescuer. There will in all likelihood need to be significant efforts in helping local communities and government representatives alike to better understand one another, and the attitudes and behaviors they exhibit. The importance of this is underscored when one recognizes that the broader goal of Basin resiliency must be addressed through multiple levels of cooperation (IJC, 2000b; Shrubsole, 2001; Haque and Burton, 2005) - federal, provincial, and municipal authorities as well the general public - to best utilize assets integral to vulnerability reduction. These assets include, for example, knowledge, experience, influence, social capital, etc.

It should be noted that Burby et al. (1991, in Tobin and Montz, 1997) found in one American study that communities that received disaster relief with conditions attached to the relief - i.e., community mitigation actions that must be undertaken to quality - were in fact better prepared. Considering the findings in this research, it is suggested that vulnerability reduction might be best served by stipulating pre-event conditions, such as mitigation measures - either at a community or individual level - that must be met in order for compensation to be provided after a flood. This would force community residents to be cognizant that vulnerability exacerbating decisions have potentially severe consequences. Namely, they would have to absorb the costs of recovery for damages sustained as a result of their failure to act earlier to mitigate damages. They would not be able to continue in the pattern of continual bail-outs by senior government seen in Canada to date (Shrubsole, 2001).

Issues related to flood mitigation through land use management and development were not raised often in discussions with community residents; however, government, municipal leaders and NGO participants felt improvements need to be made in the area of regulation and zoning. Particularly, many felt that the leadership of provincial agencies in enforcing land use policy is crucial to reducing vulnerability.

In the data there did appear a tendency to offload responsibility to the Province, which is likely reinforced by the provincial government's relationship with and attitudes towards local

communities. However, not all responsibility should lie with the senior government. Municipal governments are often leaders in planning decisions at a local level; yet in flood-related matters they exhibit significant levels of dependency on senior government support as seen in this research. This finding supports Shrubsole's (2001) contention that a culture of dependency upon senior government permeates flood management in Canada. It is, in fact, a municipal responsibility in Manitoba to develop land use plans in the floodplain; these plans designate various areas for specific types of development. Given that inappropriate development is a prime contributor to vulnerability, these decisions are crucial to the amplification or reduction of flood risk - particularly in the longer term. Municipal governments need to be encouraged and assisted to adopt a more proactive role in floodplain management as they are positioned as a bottleneck for information flowing in both directions between local communities and senior decision-makers.

Finally, the incentives for community residents to get involved in examining how local actions may impact vulnerability are negligible, allowing attitudes of complacency and dependency to flourish. There is little doubt in reviewing the results of this study that community residents have very high expectations of government, expectations that are largely met in the normal course of events but which are more likely to fail during a disaster (Schneider, 1992). In reviewing five case studies of American disasters, Schneider (1992) illustrates how gaps between public expectations and government efforts in a disaster are a serious problem. More recent research in the United Kingdom (Brown and Damery, 2002) suggests that the expectations of the public - namely, that government should be able to completely prevent damages, particularly through structural measures - results in inevitable disappointment by members of the public. They further suggest that less trust in government is a consequence of the inability of government to meet these unrealistic expectations, and that this in turn creates little incentive in communities to engage with information provided by authorities. The experiences in the Red River Basin appear similar, and certainly may indicate a dysfunctional cycle of interactions between residents and authorities that undermines capacities to sustainably manage the floodplain. As seen in the Basin and elsewhere (Brown and Damery, 2002), the capacity of senior government alone to deal with flood issues is limited. In turn it may be necessary to alter the public discourse on

responsibility for vulnerability reduction to better define and include the responsibilities of local communities in vulnerability reduction goals.

7.3 Through the vulnerability reduction lens

The following sections present conclusions about the relationship between institutional and community values and perspectives, related mitigation decisions, and vulnerability in the Red River Basin - the third objective of this study. A conceptual framework (Figure 7.1) for viewing the creation of social vulnerability in the Red River Basin, with emphasis on decision-making processes, summarizes findings.

7.3.1 Planning under conditions of complexity

Hazard vulnerability approaches conceptually are predicated on an understanding that vulnerability is a complex, dynamic notion involving multiple scales (Jones and Shrubsole, 2001). There are typically also many stakeholders. In this research, institutional informants involved in floodplain and flood management activities were mindful of the fact that they must typically plan over a very limited time horizon. As shared during interviews, personnel with government agencies are concerned about whether the issue of flood damage control will remain sufficiently high on the political agenda so that resources and funding will be adequate to address flood risk over time. NGO's within the Basin were concerned about the need to move planning in sustainable directions and spoke particularly of the limited processes available for involving multiple stakeholders; in some cases their own organizations were severely compromised by a lack of secure funding for ongoing partnership building activities within the Basin. Particularly, it is noteworthy that documents reviewed and interviews with institutional gatekeepers and community residents alike were characterized by vague rhetoric about how relations between decision makers at all levels and stakeholders need to be improved, and maintained, but these comments were inevitably accompanied by very little in the way of suggested strategies to address the problem.

Another fact that was evident from the research is that within Manitoba, there has been significant emphasis on finding 'the solution' to the flood vulnerability of the City of

Winnipeg since 1997. This 'single objective, single-solution' approach implies that vulnerability is more bounded in time and place than in fact it is. Vulnerability in the Basin is not simply about protecting economic interests in the dominant urban center, but ought to include a re-thinking of how a wide range of inter-related decisions about human use of the floodplain have created more risk over time. This broader view that includes considering multiple decisions in multiple sectors and how they potentially may impact hazard vulnerability is a cornerstone of the vulnerability approach (Mileti, 1999).

Often it appears that the complex nature of vulnerability is not evident in the evaluation and discussion of flood mitigation options in Manitoba. The floodway expansion is promoted as an engineering design to protect the City of Winnipeg to the 1/700 year flood level, which suggests to residents that they need not expect a flood to exceed that level of protection for many generations. It likely reinforces the psychological phenomenon identified as 'gambler's fallacy' which is a less-than-optimal coping mechanism. Specifically, it permits people to conclude that the occurrence of a phenomenon in one year will make it less likely to recur soon afterwards (Alexander, 2000); Alexander (2000) warns that in the case of flooding this coping mechanism is particularly detrimental. When it comes to issues of re-occurrence, the uncertainties in probability based prediction, and in estimations of naturally occurring random events (Mileti, 1999) are problematic; they are not typically discussed outside of engineering circles, particularly in public forums. Stakeholders are not told the assumptions underlying the use of probability statistics - whether they are assumptions and uncertainties about flood frequency predictions with global climate change, or assumptions about how the Basin populations may respond to another large scale evacuation. All such assumptions impact decision-making and hence vulnerability. People in Manitoba are often not cognizant of the complexity in understanding and addressing flood vulnerability across multiple sectors of society.

Vulnerability is also based on a notion that adaptation to and mitigation of floods must happen not only over wide time scales but also at multiple decision-making scales to be truly effective. The dominance of senior government in decision making, as seen in this study, undermines the notion of local community empowerment in the decision making process.

Those municipal government or local community committees that have been involved in mitigation decisions freely admit that their role is minimal for the myriad of reasons discussed in earlier chapters. Yet in vulnerability discussions within the hazards literature it is frequently noted that the community level is where the greatest benefits from mitigation are realized and it is within community ideology, that local attitudes and adjustments to a hazard are typically found (Tobin and Montz, 1997; Jones and Shrubsole, 2001). During interviews undertaken in this study certainly there was no indication that institutions or communities identify a compelling need or desire to assess community vulnerability to hazards, particularly once communities institute the measures – primarily structural - recommended by the Province's experts. This is not consistent with vulnerability reduction approaches and limits creative adaptations to changing vulnerability in this high-risk environment.

7.3.2 Community vulnerability and local capacities

This research also revealed community residents often prefer to ignore flood threat when not faced with an imminent flood, were often passive and largely unengaged in flood mitigation issues, and were willing to assign government responsibility for both preventing flood damages and compensating individuals who suffer losses. Furthermore, authorities have required little in the way of participation by communities in defining and mitigating their own vulnerability. As a result many residents have limited understanding of their own vulnerability, a hands-off approach to local vulnerability, and place government in the role of potential scapegoat should severe problems occur. As shown in data analysis, government personnel - with somewhat patriarchal attitudes towards community residents - tend to facilitate and perhaps prefer communities to remain removed from deeper involvement in decision making. This is in no way consistent with current thinking on vulnerability reduction. Pearce's (1997) research, which looked at hazard risk vulnerability models within the Canadian context, highlighted the importance of having many and diverse community stakeholders involved, adequate communication of risk to the community, and ensuring that the process is, in fact, not dependent upon 'experts.'

In Canada, this dependence upon institutional responses to any crisis (including flood disasters) runs contrary to redefinitions of natural disasters as a community-based problem requiring community based solutions (Hewitt, 1983; Mileti, 1999; Yodmani, 2001). Yet Manitoba appears to be continuing in a trend of institutional responses to flood risk, according to this study. The failure to bring vulnerability assessment to the local level does not bode well for increasing community awareness and participation in identifying and responding to hazards of any type.

This study suggests that there is also a failure to incorporate capacities among stakeholders that in fact can be utilized to reduce vulnerability (Yodmani, 2001). The data in this research illustrated, for example, high levels of social capital and cooperative decision making within the communities studied which could potentially be utilized in risk management. Numerous community values identified in this research - mutuality, volunteerism, community attachment, etc., are significant community resources that should be used to create more flood resilient communities. In fact, such community characteristics that are indicative of social cohesiveness are important indicators of a community's ability to reduce the emotional and physical impacts of disaster, and are consistent with vulnerability approaches (Jones and Shrubsole, 2001).

There are frameworks (e.g., Wates, 2000) which outline how communities might assess local vulnerabilities and capacities i.e., for example, physical, social, organizational, motivational or attitudinal vulnerabilities and capacities. Basin communities studied here had no systematic process for including vulnerabilities and capacities in every-day decision-making, a key feature of vulnerability approaches (Jones and Shrubsole, 2001).

This research showed that there are both community capacities and vulnerabilities that impact the level of vulnerability in the communities studied and that need to be considered in planning. For example, community participants noted the difficulties of having an aging population and the trend of depopulation and business loss in many rural areas. Such variables are sources of social stress and impact livelihoods and quality of life. According to Alexander (2000), scale and accuracy of risk perception depends upon the context of social

problems in a community. The data collected from community residents supports this claim as residents in the communities spent considerable time during interviews discussing that these factors are weakening their community- socially and economically. These appeared to be more immediate concerns than flood threat at the time of the interviews, particularly in Emerson. From a vulnerability perspective it suggests that such social and economic variables increase vulnerability to any community hazard as resilience is compromised through diminished capacities.

In Emerson particularly, demographics also increase the likelihood that the community residents remain passive with regard to flood issues, and dependent upon local and other leadership. On the positive side however, there are other capacities that increase community resilience such as high levels of social capital, a fairly high level of trust in local decision makers, and support for local emergency response planning.

Similarly, Ste. Agathe also had a number of strong local capacities. The town had a well-established social organizational structure- housed in both faith-based organizations and the economic development group, and a cohort of socially active families. These provided the town with the capacity to work towards a vision of the community both prior to and after the 1997 flood, albeit with alterations and adjustments. This community also had the capacity to informally rally in the face of the 1997 flood crisis. These types of community characteristics are consistent with creating resilience, and reducing vulnerability to multiple hazards.

Finally, one of the key differences seen between Emerson and Ste. Agathe in relation to vulnerability was the creation of the Red River Valley Flood Interpretive Center following the 1997 flood. The Center has the capacity to counter vulnerability through education of Basin residents, and was an adaptive response to the flood risk. One would indeed expect adaptive responses to occur in the town that flooded (unlike Emerson) given that experience affects risk perception (Lasksa, 1990). According to residents involved in the Center, financial support for the endeavor has been difficult to attain given their reliance upon government funding. Past patterns in behavior in the Basin would suggest that support for such an endeavor could be expected to diminish unless the role of the Center is valued by

entities outside of the community itself such as government, NGO's, educational institutions, or historic foundations. Knowledge and experience are powerful tools when utilized to build local and regional capacities. This is a necessary step to creating more resilient communities.

7.3.3 Motivational factors and attitudes contributing to vulnerability

The data collected in this study showed that local level motivation and attitude are clearly relevant to discussions of hazard vulnerability in the Basin. Given that Canada is a rich nation in global terms, and a welfare state with strong social supports to citizens, it does perhaps seem understandable that motivation and attitude are more implicated in vulnerability creation / alleviation rather than an absolute lack of material, monetary or economic assets are. The latter are more commonly sources of vulnerability in poorer developing nations where exposure to a hazard is typically not voluntary but rather the result of necessity, particularly in ensuring livelihood needs are met (Blaikie et al., 1994).

The documentary evidence, as well as interviews with all participants, revealed that advocacy for, and preference for, technological solutions has been prevalent historically and continues at all levels of social organization in the Basin. Bureaucrats and consultants are comfortable with the technological approaches, and citizens feel most secure and comforted by structures designed to protect them. In the rural municipality of Ritchot, clamor against the floodway expansion is not so much a criticism of structural approaches as one against perceived inequitable creation or distribution of flood risk by authorities. With technical solutions, local communities are highly dependent upon external experts and are largely absolved of responsibility for vulnerability reduction. Interestingly, Wildavsky and Dake (1990), in examining cultural bias and risk perception, suggested that the technologically pro-risk personality emerges as that of an 'obedient and dutiful citizen, deferential to authority' (p.46). The values espoused in the communities studied in this research reflect those very characteristics, confirming that their findings may well be duplicated here, in partial explanation of the preference for engineering solutions even among the public. The area of political ideology and its relationship to vulnerability reduction is an area that may warrant further exploration. Of particular interest would be to understand how collective values are

used to justify policies (Hewitt, 1992). In other words, how do values like social cohesion, individual autonomy and democratic accountability – common within a welfare state (Hewitt, 1992) - result in market led development policies that place people and property at risk?

With regard to mitigation in general, the costs of mitigation projects are not being borne in any great amount by local governments, and there is a general lack of commitment of community resources to vulnerability reduction in the Basin. As a consequence, it is also not surprising that residents are only peripherally aware of how the decisions to mitigate damages in their communities are made. As was clearly shown in the community surveys, there was a lack of public awareness of flood related issues, even within Ste. Agathe which was flooded in 1997. The community surveys illustrated citizen confusion and uncertainty about how decisions are made in both communities, and indicated that there are few linkages to assist in information exchange and planning between authorities and communities, and between at-risk communities. Such a lack of linkages also does not bode well for broader planning initiatives - a cornerstone of sustainable management of floodplains - unless this problem is addressed.

In addition, the costs of flood mitigation and compensation are distributed across the entire population in Manitoba, limiting people's perception of their own personal or community risk from flood hazard. There is little motivation to search for alternative individual or community behaviors (including development patterns) in the Basin, and little reason to get involved in evaluating vulnerabilities, mitigating risk, or in taking responsibility at a local level for creation of risk. This lack of motivation limits vulnerability reduction activities.

Alternatively, interviews related to photos taken by residents showed that, even while they are disengaged from vulnerability assessment and reduction, some members of the studied communities are also feeling somewhat helpless in having any risk-related concerns addressed. There are no clear processes for allowing residents to bring concerns to authorities. Disengagement from decision making is a reasonable outcome when disempowered. Examples included citizens' perceptions that they could not influence the floodway expansion decision and the experiences in Ste. Agathe when residents did not feel

heard by authorities on the issue of the height of the new town dike. The experiences of that community in 1997 were a trigger event that jogged the collective out of a sense of complacency regarding flood threat. Later, however, when risk-related concerns about the town dike (which were based on local knowledge and experience) were dismissed by authorities, it was not conducive to further vulnerability discussions. Long entrenched attitudes and associated values - such as the transfer of responsibility for risk mitigation to government agencies - are not likely to be modified in this environment.

As discussed elsewhere, there is also a keen sense of entitlement among residents; there are compensation arrangements for flood damages to community infrastructure and personal properties which consist primarily of a split of the majority of the costs between the two senior governments (provincial and federal) in the event of a large flood. Furthermore, in 1997 the government lacked the political will to deny compensation to homeowners based upon individual property owners failing to flood-proof to existing government regulation guidelines (IJC, 1997). While these guidelines now have been modified again to reflect that flood-proofing should be undertaken to the 1997 flood line plus 0.6 meters (as should new construction), whether the government will enforce its own legislation – and deny compensation in the face of what would likely be local outrage - remains to be seen. To alter a sense of entitlement held by residents over many years, an entitlement likely viewed as a *right* to compensation, will be difficult and will require clear communication of expectations, and government willingness to act in an unpopular manner. This is always a political challenge, and would require a longer term political and social vision of how our communities can become more resilient in the face of ongoing flood events. It means changing our standards, and ultimately values, related to what is acceptable behavior in the floodplain area.

7.3.4 Watershed planning and sustainable approaches

There has been some progress in thinking about flood vulnerability reduction within the Basin - at least conceptually. This progress is reflected in promotion of broader regional planning, particularly at the watershed level. Addressing vulnerabilities through better, more

integrated planning (Pearce, 1997; Jones and Shrubsole, 2001; WMO, 2003) is seen increasingly as a preferable approach to vulnerability reduction compared to a strictly engineering orientation. In the Basin, such organizations as the Red River Basin Commission and the International Red River Board are promoting a planning approach inclusive of all stakeholders. The IJC reports following the 1997 flood also recommended that this approach be used to address Basin vulnerability to flood in a more comprehensive way. More recently, the Manitoba Water Strategy (2003) introduced by the current government emphasized watershed based management. The new Water Protection Act, proclaimed by the Province in June 2005, also acknowledged and created watershed planning authorities to develop management plans in watersheds, and the Act contains a clause guaranteeing that there will be consultation in the development of the plans with local planning groups (Conservation Districts, municipal councils, First Nations etc.). How these new perspectives and legislative requirements will be implemented over the next few years will be the true test of how committed the government and Basin groups are to watershed planning. The allocation of resources to these activities is a key component yet to be addressed. An important goal for further research would be to assess the success of such new initiatives and - this research would suggest - to evaluate if the Provincial government is able to move beyond rhetoric to truly engaging in more integrated and sustainable approaches.

Along with the concept of vulnerability reduction the concepts of sustainability and sustainable floodplain management have earned proponents among hazards and disaster specialists. Mileti (1999) emphasizes that 'sustainability' means that a locality subjected to extreme events can tolerate and overcome damage, diminished productivity, and reduced quality of life without significant outside assistance. Like the concept of vulnerability, sustainability in this context is a process rather than an outcome, with social goals as well as economic and engineering goals highlighted. Both vulnerability and sustainability are concepts that are reliant upon capacities existing within communities and the ability of humans to adapt to changing circumstances within linked human-natural systems. Like vulnerability, time scale is important, and longer time scales are needed to further goals of sustainability. Like vulnerability reduction approaches, sustainable hazard management is dependent upon human ability to generate new understandings of the hazard. In turn, this requires human decision-makers to learn from mistakes and adapt accordingly.

Within the Basin the idea of 'sustainable floodplain management' was mentioned by study participants, particularly by government and NGO participants, but not defined. Some participants see it as essential to reducing vulnerability but few had concrete suggestions on how to achieve it. Limitations in information exchange between stakeholders, limited understandings of technical data, poorly crafted public participation activities, the variable nature of political commitment, and lack of tools to evaluate trade-offs between alternative actions are but some of the variables that constrain sustainable floodplain management if one considers the findings of this research.

A lack of integrated floodplain management approaches in the Basin, while largely explained by the aforementioned problems, is also an area in which leadership can make a significant impact on vulnerability reduction through improved policy development and flexibility, and the provision of necessary resources. If senior government agencies required that hazard mitigation be incorporated into all normal decision making (as suggested by Tobin and Montz, 1997), and as part of standard planning practices, it would seem an effective way of altering actions within the floodplain. It would also address some of the root causes of vulnerability and perhaps, most importantly, hasten a change in behavior and perception of risk within the Basin. New legislation requiring municipal governments to create their own development plans ought perhaps to require (precautionary) planning for multiple hazards and not just flooding, further encouraging vulnerability reduction values in planning.

7.3.5 Development values and vulnerability

In previous chapters, it was made evident that communities and institutions alike place great store in the promotion of development values and growth. In fact, rich countries in general have a commitment to economic growth (Wilensky, 1975). It is well known that such values have contributed to flood risk (Shrubsole, 2000). However, this research offered some important further explanation of why growth and development are so highly valued in local communities.

Community participants saw development as key to community viability, something residents valued highly and which was inexorably linked to quality of life, also an important value among participants. As a consequence, any attempt to restrain development as a means of vulnerability reduction may be ill-received at a community level without community involvement and discussion. Ideally, the community itself should begin to identify what limits to development are necessary, while still maintaining (or even enhancing) quality of life. Development values, seen as fundamental to quality of life, are unlikely to be significantly altered without community debate. There is an important role for leaders and planners at all scales (Tobin and Montz, 1997); they might help communicate the links between development practices, creation of risk, and the varied harms that come through exposure to a hazard (stress, economic loss). Government particularly has a role to highlight risk creation and tradeoffs that are essential to making development decisions in the Basin. It is equally important that discussions clarify that risk is in actuality often merely transposed to another time, to another generation, when development occurs. Government also has the ability to urge change through incentives and disincentives such as regulatory demands related to development and enforcement of same, or instituting programmatic initiatives.

In terms of the relationship between creation of vulnerability and policy decisions, vulnerability may also be seen as the consequence of a series of poorly crafted policies and resulting practices in a hazardous zone. In the Red River Basin, in examining the 1997 flood, the IJC (2000b) was critical of government policy on several fronts, from development to water resources management, for its contribution to flood vulnerability.

7.3.6 The role of leadership in promoting vulnerability reduction

In addition to influencing and guiding development practices, another important role of leadership is to openly dialogue about how social and economic values might potentially coexist (adapted from Cutter, 2000), and how such values may work in conjunction with vulnerability reduction goals. Leaders are the ones who typically manage information that informs decision making processes. This research would suggest that beyond the obvious need for information related to flood warning, preparedness, emergency response etc., there is also a need for a broader educational component to hazard management, one in which

communities are provided with the information and tools to project and address community vulnerabilities that emerge from multiple sources- not simply vulnerability caused by exposure to a hazard, but rather social sources of vulnerability.

One of the existing indicators of vulnerability considers the level of stakeholder authority over planning or mitigation decisions - often referred to as a measure of 'locus of control' (Jones and Shrubsole, 2001). It is a measure of institutional equity. One cannot help but conclude from this study that stakeholder participation in decision-making needs to be improved. With the exception of Provincial representatives and some municipal leaders, many stakeholders appeared to feel neither involved nor valued in decision making scenarios; in fact, quite the contrary.

7.3.7 Public participation and vulnerability

It was seen in the documentary and interview discussions that some bureaucracies in the Basin tended towards inflexibility and institutional inertia. It is not uncommon for institutions, in fact, to try to apply old, often outmoded rules to problems, so that their efforts actually perpetuate old problems (Nash and Calonico, 1993). This may be somewhat the case in the Red River Basin. Feedback from bureaucratic representatives involved in floodplain management showed that they readily engaged in activities that were sanctioned and justified by a mandate. There was little discussion of expanding the range of actions, or devising new public participatory processes in decision making for use in fulfilling their mandate.

Furthermore, institutions are characterized by competitiveness (Rokeach, 1979) especially given the limited resources available to them. This characteristic also limits cooperative approaches to complex problems like flooding. As discussed earlier, lack of means for engaging communities and the general public in cooperative decision-making related to flood risk may well disempower local residents. In general, this lack of engagement may be seen in part as a leadership failure by flood mandated institutions and local leadership alike, as it results in status quo decision making and a failure to promote more resilience to flooding.

7.3.8 Failing to link community viability with vulnerability

Interestingly, while bureaucrats and NGO's contemplate sustainable development of the floodplain, community data clearly showed that community sustainability and viability are major priorities of residents interviewed. This ought to be a point of convergence, for bringing interest groups together. Linking community viability with the need for vulnerability reduction could be a focal point of discussions. This is not however the case. This community research showed there is a high level of concern in communities about the impacts of the multiple challenges facing rural communities such as rural depopulation (particularly the loss of young families), and an aging population. There was evidence of social and economic vulnerability through changes to livelihood patterns, such as changes to farming practices (specifically the loss of family farms), demise of small community businesses, and an increase in commuting to larger centers for employment. These changes have challenged not only community viability but quality of life, and the nature of community identity, for residents.

With multiple vulnerabilities, some of which are regularly intruding upon daily life, flood threat is a source of vulnerability that can be more easily disregarded as years pass between major flood events. However, it is also suggested that vulnerabilities can be compounded (Jones and Shrubsole, 2001) raising a concern that the communities may in fact be less resilient in the face of a natural hazard event (such as a flood) as a result of other stressors faced by rural communities. Economic and social vulnerabilities ultimately influence and are influenced by flood (or other hazard) vulnerabilities. Declining communities may lose a substantial source of social capital with demographic shifts which means the loss of a key social resource to help the community recover in the event of a flood. Even in Ste. Agathe, the loss of nine families after the 1997 flood due to expropriation of land for the dike is an unsettling blow to the community. One cannot help but wonder if it might have been prevented through better planning.

7.4 Vulnerability framework

The findings of this research have resulted in the creation of a flood vulnerability framework for the Red River Basin context. It is modeled in part after the framework of Wisner et al. (2004) and Blaikie et al. (1994) with emphasis on the root causes, and dynamic processes that are implicated in the creation of social vulnerability to flood. Much of the disaster literature iterates that there are both social and physical contributors to flood disasters, and they must coincide in time and place for a disaster to occur. The variables in Figure 7.1 present the socialization of flood vulnerability in the Basin, half of the (social-physical) hazard complex, but the least understood. It represents some of the root causes of vulnerability highlighted in this research, and associated processes that further attenuate vulnerability. The factors are multiple, varied and overlapping.

7.4.1 Progression of social vulnerability framework

Figure 7.1 below is a description of the social creation and progression of flood vulnerability in the Red River Basin; it emphasizes how people have 'created their own vulnerability, largely through their own decisions and actions' (Tierney et al., 2001). The purpose of this research was to explore the less well-understood factors that impact flood vulnerability in this context; the emphasis was on the social creation of vulnerability within Basin communities that can be linked to community and institutional perspectives, and values and priorities that influence decisions on how to mitigate flood risk. These perspectives and priorities often reflect other social, political or economic factors that compromise community sustainability and are regularly given priority over flood risk issues except in the immediate aftermath of a significant flood event.

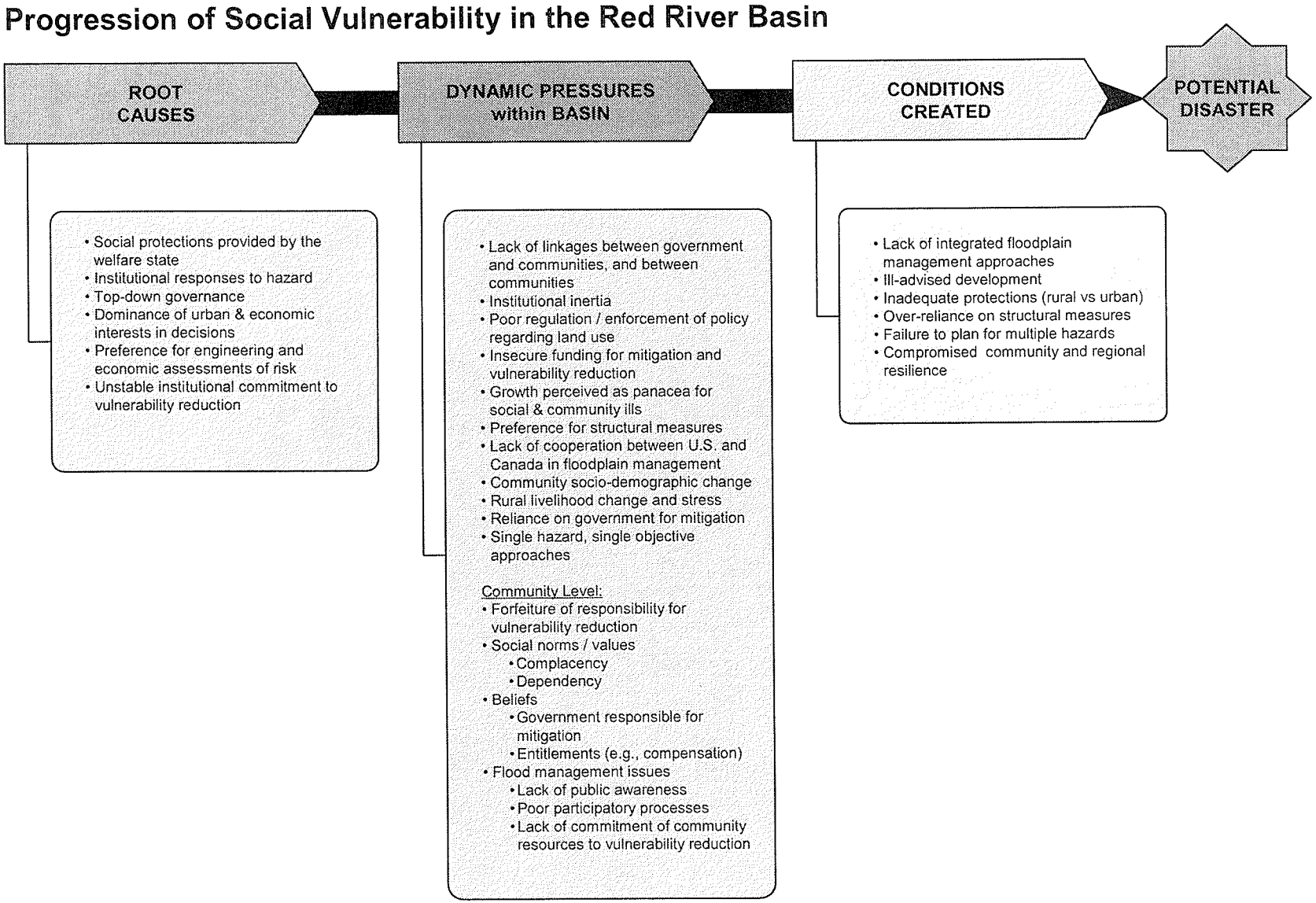

Figure 7.1 – Progression of Social Vulnerability in the Red River Basin (adapted from Wisner et al., 2004 after Blaikie et al., 1994).

The original framework was a generic disaster model termed the 'Pressure and Release Model' (PAR) by Blaikie et al., 1994. It depicted disaster as occurring at the juncture of two opposing forces - those generating social vulnerability on the one side and physical exposure to a hazard on the other side, with increasing pressure on people arising from either side as a result of both their vulnerability and the actual impact (and severity) of the hazard event (Blaikie et al., 1994). Figure 7.1 above and Figure 2.1 in Chapter 2 show a more recent version of the Blaikie et al. (1994) model, with minor modifications by Wisner et al., (2004).

The adaptation of the framework developed in this research includes the progression of vulnerability side of the PAR model only, showing the progression of vulnerability in the Basin by examining the root causes, dynamic pressures, and specific conditions (outcomes) that describe vulnerability in this context.

While the physical hazard side of the model is not portrayed here, there are two situational factors that are significant in understanding human perceptions and responses to flood threat in the Red River Basin. One is the long period of time between events which permits memories of events to fade and can reduce a sense of urgency to address vulnerability. The flood hazard is also slow onset which has facilitated emergency preparations and evacuation of at-risk communities thus reducing impacts on citizens during past floods.

As seen in this study, there are various root causes of vulnerability that have been identified in the Basin. Factors that reflect the power relations within society include the social protections provided through the welfare state in Canada. Institutional responses to hazards (including flood) have also resulted in top-down governance in hazard management by flood-mandated institutions. Traditionally there has also been some instability in the level of political commitment to vulnerability reduction for various reasons, one of which is likely the jurisdictional disputes between the three levels of government within Canada (federal, provincial and municipal) over financial (and other) responsibilities for mitigation. Within the Province of Manitoba (like much of Canada) urban interests dominate due to the centralization of economic power in the capital region around the City of Winnipeg. Historically, there has also been a preference for traditional 'objective' engineering and

economic assessments of risk in determining mitigation activities, although that is being increasingly challenged.

The dynamic pressures that result from such root causes of flood vulnerability can be found both external to and internally within the communities studied. The welfare state provisions mean that at an individual and local community level, people depend upon and expect government to provide both mitigation and, in the event of damages, compensation to restore them to pre-flood conditions. The institutionalization of hazard management is likely implicated in an evident lack of secure linkages and communication networks between government decision makers and Basin communities, as well as weak linkages between at-risk communities. These weaknesses limit broader participatory capacities.

In this research there were some indications that government institutions may suffer from institutional inertia; they appear focused upon concerns related to both their individual mandates and funding security. This can compromise collaboration with other agencies and communities. It may in part explain why, since 1997, of the key 28 recommendations made (to the U.S. and Canadian governments) by the IJC (2000b) for future actions to address Red River flooding, those recommendations that 'involve multiple agencies, and perhaps, multiple objectives' have 'achieved very little success' (Halliday, 2003, p. vii) unlike recommendations aimed at a specific agency alone.

A lack of intergovernmental and inter-institutional cooperation can also contribute to a lack of cooperation between the U.S. and Canada in water and floodplain management decision making. This has the potential to increase regional vulnerability to flood. It also results in single hazard approaches to vulnerability rather than the ideal in planning - i.e., an approach which incorporates both multiple hazards and planning at broader scales (such as watershed planning). Institutions within the Basin also lack available tools and mechanisms for collaborative approaches to floodplain management which compromises integrated floodplain management approaches even while rhetoric in favor of them is evident.

Also related to institutional response to flood risk, new designated flood regulations in the province since 1997 are intended to help ensure that new structures meet building standards to protect against a flood of the 1997 magnitude. However, historically there has been a pattern of poor use of existing regulation and enforcement of same that must change for these new measures to truly be effective. Related to floodplain regulation is the concern that vulnerability is being increasingly created by an attitude that sees growth and development as a dominant value in society, and as a panacea for social ills. Similarly the aforementioned dominance of urban economic interests in decision-making compromises the security of small rural community interests. Furthermore, the creation of vulnerability may be seen as linked to government assumption of responsibility for restoring families and communities to pre-flood conditions when they suffer damages – primarily through compensation arrangements. This reinforces old patterns of unsafe development, vulnerability attenuating behavior in the floodplain, and allows residents to ignore much of the local risk.

Institutions themselves identified that insecure funding for flood mitigation is an issue that compromises their mitigation activities in the floodplain. When it comes to decisions to mitigate risk, the allocation of resources and financial investment are in structural solutions to flood vulnerability; there is a seeming preference for technical solutions at all scales for the myriad of reasons discussed earlier - many of which were linked to expectations of government and philosophical assumptions about how hazard problems should be addressed. The technological and structural approaches to mitigating risk also depend upon a limited number of tools – most often constrained to a form of cost-benefit analyses – to determine mitigation strategies. Such tools have limited ability to consider a broad range of social costs related to flood mitigation, particularly over the longer term.

Under dynamic processes listed in Figure 7.1 are also some local community level values, beliefs, and attitudes that constrain vulnerability reduction (e.g., complacency). They are often directly linked to root causes (e.g., institutionalization of flood management) and reinforced by societal arrangements and aspects of the global economy. More specifically, one of the characteristics within the communities studied, and reinforced by institutional perspectives and actions, was a high level of forfeiture of responsibility for vulnerability

reduction at the community level. Social norms and values reinforce an attitude of complacency with current flood management practices, or difficulty in maintaining a proactive attitude towards flood mitigation due to a sense of dependency on authorities. Ideologically, the Canadian welfare state presumes government intervention when citizens' experience crises, exacerbating such dependency. This is further reinforced by the post-disaster assistance practices in Canada. As a result, the belief that government is in fact responsible for vulnerability amelioration (and that government will pay for and implement local mitigation measures), and that flooded residents are entitled to broad compensation for damages, is understandable within this context.

With regards to decision making, many community residents in this study had little awareness of mitigation options for their communities, and the details related to, for example, emergency response plans or dike maintenance. In part this may be related to a lack of flood-related communication linkages outside of the communities, which contributes to poor participatory processes for flood management decision making. Within communities, the apparent preferences for structural measures mean that mitigation decisions are largely viewed as outside of the realm of community expertise. Overall, the majority control over mitigation decisions remains external to the community level and is reinforced by a lack of commitment of community resources to vulnerability reduction.

Another significant dynamic pressure within the Red River Basin relates to socio-demographic shifts in southern Manitoba communities, which are linked to rural to urban migration, livelihood stress, and reduction in services in rural communities. These weaken rural community and regional resilience to any hazard because communities are negatively affected by (new) distributions of wealth and power that accompany these changes (Blaikie et al., 1994). Ultimately, they have reduced access to resources - economic and social.

Finally, the root causes and dynamic pressures discussed above result in several key unsafe conditions that are indicative of flood vulnerability in the Basin; these conditions are at risk to continue without significant abatement unless there is a restructuring of priorities and values in the region, and creation of new vulnerability reduction policies that are enforced.

For example, an obvious source of vulnerability is ill-advised development in the Basin; this development has however been facilitated through an over-reliance on structural measures, and a lack of integrated floodplain management approaches. There are also inadequate protections for some smaller rural communities, and poorly crafted policies with regard to how to balance the need to protect Winnipeg with the rights of small communities south and north of the City along the Red River. Overall, these perceived inequities compromise regional and community resilience to multiple hazards as rural communities begin to feel marginalized. Finally, there has been no evidence of a multiple hazards planning approach to planning in the Basin.

In summary, the diverse causes and factors influencing vulnerability seen in this framework suggest that the problem of vulnerability must be addressed at multiple levels and involve many stakeholders. Vulnerability reduction must be an exercise in interdisciplinary thinking and decision making, and address fundamental beliefs about hazard creation and amelioration - including who ought to be responsible for addressing social sources of vulnerability in society. Most important, vulnerability reduction efforts in the Red River Basin will clearly require the ability to integrate understandings that encompass social, economic, political, and historical variables as well as the biophysical aspects of the problem of creating safer communities.

7.4.2 Red River Basin: the PAR model in rich nation context

The PAR disaster model developed by Wisner et al. (2004) and by Blaikie et al. (1994) highlights a progression of generic factors that contributes to vulnerability creation particularly in the context of poorer nations. The progression of vulnerability in the Red River Basin, including root causes, dynamic processes and the creation of unsafe conditions outlined above, suggests both similarities and differences in this adaptation of the model when examined within the Canadian – rich nation – context. These will be discussed here with reference to the original Blaikie et al. (1994) model.

Blaikie et al. (1994) describe the displacement of economically or politically disadvantaged peoples onto hazard-prone lands to engage in livelihood activities as a key contributor to vulnerability in poorer regions of the globe. These are marginalized populations with very limited choices related to where to live and work. This differs from the Red River Basin context where people are not required to place themselves in insecure environments to provide a livelihood. Residents of Canada have a range of choices in livelihood activities and a social safety net (i.e., social welfare system) should they be unable to make a living. As a consequence, in Canada, people may choose to be at greater risk from a hazard event; however, it is a voluntary assumption of risk. A Red River Basin example includes those who leave the City of Winnipeg (and the protection of the floodway) to live in rural communities close to the river for non-livelihood related reasons. For example, quality of life preferences, reduced taxes etc., may be the benefits enjoyed outside of the structural protection of the floodway. Individual freedom to choose where to live and raise one's family is a prominent value in Canadian culture even if one knowingly chooses an area more vulnerable to flood hazard.

Linked to this, and in a clear departure from the Blaikie et al. (1994) model, people in the Red River Basin have economic and social assets in relative abundance. Absolute levels of poverty are not as high as in developing nations although there are examples of marginalized persons who have experienced proportionally higher levels of vulnerability to Red River flooding (e.g., First Nation Roseau River Reserve). People typically have more financial assets than in poor countries. The Canadian social welfare state offers additional protections to people who require livelihood assistance (e.g., welfare; unemployment insurance) so they are not forced to live in hazardous environments. In the event that someone is exposed to a risk such as a flood there are social arrangements to assist them in coping with the risk or with recovery in the case of damages (e.g., the Canadian Disaster Financial Assistance Arrangements). All citizens are eligible for restoration and compensation in the event of a flood regardless of their socioeconomic status.

Canadians also rely greatly on financial assets either from their own personal resources or that of the government, and less on the non-economic assets that are quite common in poor

countries (reciprocity, kinship relations, etc). Ironically, the social protections in Canada are implicated in Canadians failing to alter risky behaviors as the protections encourage complacency in the face of risk. This is a luxury not available to poor people. The ideology of the welfare state has also created high expectations among residents of Canada, and the Red River Basin specifically, that government will assume responsibility for people's security and most essential needs, allowing them to abdicate individual responsibility. Citizens have come to view the provision of such security as the role of government.

Blaikie et al. (1994) talk about other forms of vulnerability created by global economic pressures; the operation of the global economy has been instrumental in encouraging rural to urban migration in many poor nations. Rural to urban migration in Canada is also due to global economic forces – which have prompted the decline of resource based economies such as agriculture and a rise in service industries - but it is qualitatively different. The move to urban centers is not likely to increase vulnerability as in Blaikie et al.'s (1994) model. In the Basin, vulnerability tends to increase within the rural communities left behind because community resilience is diminished with, for example, the decline in population, fewer businesses, and a proportional increase in the elderly. The elderly, for example, are likely to have less ability to recover from a flood event - as was seen in Ste. Agathe with the loss of some long-time residents as a result of the 1997 flood.

It is also necessary to point out that the emphasis in differential vulnerability common to the PAR model – which suggests that the most marginalized are much more vulnerable and suffer in greater proportion if exposed to a hazard - is not as evident in a context with social protections for the most vulnerable, and in which power relations are more equitable due to democratic political processes.

Finally, and perhaps most importantly, it is the institutionalization of hazard management in Canada that is the greatest difference between many poor nation contexts and that of much of Western society. One consequence of institutionalization is that vulnerability reduction is dominated by bureaucratic elites, often in a top-down manner that alienates decision makers from the communities for whom they are responsible. Authorities are often seen as more

responsive to economic and political pressures than to the needs of community residents. It is understandable that recent attempts by the government to divest responsibility for vulnerability reduction to local communities causes role confusion and mistrust by the public. This is compounded by the quality of social interactions between authorities and communities (including public involvement overtures by the government) which have been viewed as heavy-handed and poorly conceived. The onus must be on government authorities to embrace partnerships with community stakeholders, and share decision-making power with members of vulnerable communities so that a shared model of hazard management can evolve, one that spreads responsibility among all residents of the Basin and encourages better decision making within the floodplain. Only that way can the social construction of vulnerability (and the poor decisions both contributing to it and flowing from it) be addressed.

7.5 Recommendations

The final objective of this research was to provide recommendations on how social sources of vulnerability to floods might be addressed in the Red River Basin. Four broad recommendations based on the findings are presented.

Recommendation 1:

Address weaknesses in the public perception of flood risk and the role of stakeholders in reducing vulnerability

Voluntary assumption of risk characterizes rich countries (Blaikie et al., 1994; Rodrigue, 1993) like Canada; this is likely in part due to desensitization to the occurrence of extreme hazard events (Jones and Shrubsole, 2001). It seems reasonable to suggest that desensitization is likely enabled in Canada because citizens are shielded from the consequences of their decisions (such as where they live in a floodplain) due to lack of engagement at a community level, government provision of assistance during a flood and during recovery, and people's own significant financial resources in many cases. Certainly this research showed that people rely heavily upon government in facing flood hazard.

Vulnerability for many communities in the Basin, unlike that of poorer countries, may also be the result of accepted freedoms to live where, and often how, individuals choose (subject to incomes), and government reluctance to say 'no' to citizens who want to reside or conduct other activities in vulnerable regions. Canadian notions of civil liberties are firmly entrenched in the Canadian psyche, and Canadians highly value freedom from governmental interference in their individual and collective decision-making. These are values that allow people and businesses fair latitude within a floodplain and constrain government regulation without extreme justification. Paradoxically, Canadians have come to expect government intervention when it comes to protection against many risks such as natural disasters. This is a contradiction that must be explored through open dialogue within Canadian society. Knowledge of vulnerability creation and amelioration is a necessary step in changing perceptions and behavior; the public needs to be informed about how individual and collective actions have potential consequences for the future. This research has shown people must also be challenged in their assumptions about their own role and that of government in vulnerability reduction. It is likely to be a hard sell in a society whose members prefer to not acknowledge the unpleasant, and hold private property rights as sacrosanct.

However, the events of 1997, which heightened the consciousness of many residents, should be used as a trigger for vulnerability discussions. They can also be used to justify the refusal of government to support inappropriate activities in the floodplain. Furthermore, certainly events these last six months, namely significant spring flooding in Manitoba in 2006, have confirmed that high spring flood waters are a continuing threat. This study highlighted that residents are highly attached to their communities, are concerned about and (prioritize) the viability of their communities. They also have local experiential knowledge about flooding that ought to be included in planning and in the decision-making process for mitigating flood risk.

The Flood Interpretive Center in Ste. Agathe is also a forum that should be used to inform and educate, a first step to perception change; the Centre has an interactive program to enhance the awareness of youth and adults alike, and yet is currently underutilized according

to interviewees in this study. It is important that Basin communities commit the events and experiences of past floods to a broader collective memory, not viewing past events as aberrations occurring in a few unfortunate communities. Once flood risk forms a more significant part of the collective consciousness, adaptive behaviors are more likely to follow.

It is in large part the role of politicians and managers to minimize vulnerability through helping to change perceptions among citizens and mandated agencies/administrators (Tobin and Montz, 1997). To accomplish such a change in public perception they should ensure that the broader public is not only aware of flood history and hazard context, but that citizens are also involved in mitigation discussions- prior to decisions being made. Token public involvement processes, too frequently seen, undermine public participation and must be eliminated in favor of true collaborative processes. The issue of citizen participation in decision making is however a complex one. There is no doubt that limited resources and budgets available to government departments are a factor in engaging the public; certainly it was a recurring theme among government personnel interviewed. There needs to be attention given to identifying what form community participation might take, and where it is feasible and not too laborious. Considerations should be given to, for example: What policies most require community involvement? Which issues most need addressing? Which ones really need stakeholder input and implementation? (adapted from Irvin and Stansbury, 2004).

Stefanovic (2003) claims that there is one key ingredient in modifying behavior and preparing more wisely for hazards: transparent communication between decision makers and the public. Perceptions can only be altered when information about risk creation is able to be interpreted, discussed, and debated by all audiences. This research suggests that there ought to be mechanisms within the Basin that ensure that shared misconceptions about vulnerability - which can easily abound within communities - can be readily identified and addressed. Local leadership should also take on a significant role here to act as liaison between senior bureaucracies and residents, and to advocate for necessary resources at a local level to address vulnerability in the local context. It was evident that leaders in small rural communities are becoming more knowledgeable and proactive in flood management issues; this should be further encouraged.

Institutions involved in flood management within the Basin also need to take ownership for the existing levels of vulnerability, and to take leadership in guiding our society, communities and individuals in making better decisions in the floodplain; specifically, this should include institutional proactivity in challenging many attitudes and values that attenuate vulnerability - development priorities, dependency on technology, dependency on government for mitigation and flood recovery, etc. The Red River Basin Commission, formed in 2002 through the amalgamation of a number of American and Canadian NGO's involved in floodplain issues, is one institution that may in fact be positioned to take leadership given the appropriate resources.

Finally, it would seem of the utmost importance that the fundamental complacency in the face of hazard within the Basin be challenged. It is based in part on the perception that structural works are the best solution to vulnerability, and as long as they are a distinct government priority after each flood event, people may once again resume complacent attitudes. In the last few years, the over-emphasis on the floodway expansion poses a danger in this regard unless perceptions are challenged, and people are sufficiently informed. Specifically, the public needs to understand that the protection afforded by the expansion – in the order of protecting to the 1/700 year level – does not mean this generation (or the next) may not be devastated yet again. Such misconceptions must be corrected or collective decision making will fail to adequately take risk into account.

Recommendation 2:

Expand the use of nonstructural measures through improved leadership and use of more diverse tools for economic and social assessment of mitigation alternatives

Most interviews with participants in this study revealed that structural measures are what Basin citizens think of when asked about 'mitigation'. There was some reference as well to the importance of forecasting and of emergency response, which are examples of nonstructural measures. Most other nonstructural measures were generally ignored unless participants were prompted to consider other options. Members of NGO's were the only ones

who seemed highly cognizant of the need to expand the repertoire of options in discourse about flood vulnerability.

Some Basin-wide NGO's (e.g., Red River Basin Commission) might serve as an important resource in bringing a wider range of mitigation options into regional and community discussions and decision making. NGO's involved in this study sought to further the goal of broader based planning, sustainability, and more consideration of human variables in hazard creation, all of which are key features of the vulnerability perspective in hazard management. Most importantly, their existence indicates that there are already established NGO's that are structured to promote the cause of vulnerability reduction and could presumably take a leadership role. They already have cooperative relationships with multiple stakeholders and a very inclusive perspective in decision-making. They may well be better able to facilitate the participation of community residents and groups in addressing flood risk than government personnel or government consultants. Ironically, while they appear to be less constrained philosophically than government agencies in terms of how they view vulnerability reduction, they are constrained by lack of formal mandate and funding. The challenges for these pioneering organizations include, for example, insecure funding, unstable political support, and a lack of authority to move beyond conceptualization of their sustainable planning vision to actually implementing their ideas. There is tension between their values/perspectives and those of some authorities who are socially sanctioned to conduct flood mitigation activities. A truly cooperative approach to floodplain management issues must address these tensions through open dialogue and sharing of decision-making power.

To practically implement a new broader vision for mitigating flood risk – inclusive of an array of nonstructural approaches- also would greatly challenge the status quo related to mitigation decision-making processes. This would be a highly desirable and proactive approach to vulnerability, albeit difficult for established authorities. Both decision-makers (agencies and authorities) and decision-making processes would be subject to critique. This suggests a higher standard would be applied to the determination and defense of preferred mitigation actions by authorities. Statistical calculations of probabilistic outcomes from certain actions would be placed within a public context that underscores rather than ignores

the underlying uncertainties, and addresses the possibility that new vulnerabilities may be created in undertaking certain actions. One clear and current example is seen in the floodway controversy if one views this mitigation project as ameliorating physical vulnerability while enhancing social vulnerability (in communities immediately south and north of the floodway).

Finally, there is a need for research and investigation into alternative decision making frameworks within this context, or an expansion of available tools to include social impacts of mitigation actions. The over-reliance on engineering assessments and traditional cost-benefit analysis fails to capture and account for the social impacts of mitigation, many of which cannot be readily quantified.

Recommendation 3:

Develop policies to enhance a proactive role for government in vulnerability reduction and to provide incentives to local communities to take responsibility for the assessment and addressing of local vulnerabilities

Generally it may be seen from this research that government policy has been weak with regard to flood vulnerability reduction in the Basin. Evidence of this is found in permitting of ill-advised floodplain development, and ignoring prior flood events that revealed the consequences of such development. Prior to 1997 government policy ignored violations of its own floodplain construction regulations, failing at enforcement and thereby undermining vulnerability reduction goals. It is essential that mandated authorities, in relation to all flood related matters, promote the notion that vulnerability creation or amelioration must be a fundamental consideration when all development or mitigation decisions - all decisions in fact - are undertaken in the floodplain. They should be clear that they have been assigned that role and are to undertake it on behalf of society (Rokeach, 1979) - in consultation with the broader community. Serving society is the 'raison d'etre' of institutions. Institutions ought to be clearly able to rationalize their conception of the 'public good' and work cooperatively with stakeholders to define the meaning of the term in the context of mitigation decisions; public interests are not served when institutions are perceived as autonomous and inflexible.

Improving policy for vulnerability reduction is ultimately highly dependent upon political will. The adoption of a 'precautionary' principle in policy development- rather than a reactive approach to vulnerability reduction (following a disaster) - would be a logical first step.

Consistent with Tobin and Montz's comments (1997), policy development that encourages - perhaps even mandates in this instance - more nonstructural measures should be identified and helped to gain support at a local level. Placing mitigation under an appropriate level of local community control would be one way to deal with inadequate local involvement in mitigation activities, inadequate assumption of responsibility for vulnerability creation, and general lack of awareness of human creation of vulnerability. The research findings in this study attest to the fact that these are all significant contributors to Basin vulnerability to flood. Local control also allows residents to incorporate mitigation in community visions of the future, and make small adjustments to reduce vulnerability over the long term. Community governance was historically a reality for many nations (Shaw and Goda, 2004); it is now slowly being diminished in the highly institutionalized responses to flooding as in Manitoba. It is worth questioning if that is the best way to create resilient communities. Vulnerability approaches would argue it is not, for the very reasons cited in this thesis. It is simply not sustainable to have only institutionalized responses and huge numbers of the population oblivious to the fact that decisions made every day in the Basin place all humans at risk.

Senior government, in their leadership capacity, might also encourage local vulnerability assessment through incentive programs, tax relief etc., to communities who undertake their own assessments of community vulnerabilities and capacities so they might be used in planning. This also makes sense as there are attempts by the Province to increasingly have municipalities take control over and formalize their local development plans. The two (i.e., assessment of vulnerability and local development planning) ought to be done simultaneously.

Ultimately vulnerability reduction in the Red River Basin context ought to aim for a model of shared responsibility between communities, institutions and other key stakeholders. This would require policies that clarify the roles and responsibilities of each party in vulnerability reduction, facilitate (or even mandate) the accomplishment of those responsibilities, and hold all stakeholders accountable within the context of their responsibilities.

Compensation arrangements are another area where policy ought to be clarified and reworked. In the aftermath of 1997 the outrage at the disaster assistance program was the result of inadequate processes that at times exacerbated suffering of flooded residents. Now, with the floodway expansion, communities who are anticipating increased risk due to floodway operation are understandably looking for compensation assurances. Here again government ought to ensure their policies and processes are abundantly clear in advance of an event so people might make informed decisions about their level of personal and community risk. What is particularly problematic is policy that is created to help alleviate harms due to government-created inequities in protection but that is simultaneously vague, or incomprehensible. The interests of the at-risk residents are already compromised because the policies may well be interpreted at some future date by a future government who will not feel as compelled to enforce those commitments to residents given a different political climate. This is an ethical issue and should be treated as such, with government protecting the rights of its minority residents in small communities in the Basin.

Recommendation 4:

Ensure long term political commitment that will provide both a vision and funding for flood mitigation and vulnerability reduction activities in the Red River Basin

This research highlighted that there are financial and political obstacles to vulnerability reduction in the Basin, several of which were discussed in the preceding recommendations. From the perspective of institutional informants there were several main concerns that are seen as barriers to vulnerability reduction.

There was acknowledgement that mitigation decisions are made with inadequate financial resources to permit time to evaluate and design the optimal solutions possible. Also there is inadequate assurance of financial and other resources to plan and implement mitigation actions into the future due to the electoral cycle, and the possibility of loss of political will to prioritize flood mitigation. These financial and political constraints were also were seen as deterrents to the realization of sustainable floodplain management practices and the competent development of regional watershed planning approaches. One cannot help but assume that the achievement of this recommendation (to overcome political obstacles to vulnerability reduction) will depend upon two factors. One is the number of floods in upcoming years which will once again jettison these issues to the top of the political agenda. Some of the predictions related to global warming suggest more extreme floods may indeed occur in future. The second influential factor will be whether there is sufficient pressure applied to government from NGO's or from the grass roots community level to prioritize vulnerability reduction.

Finally, there were indications from institutional participants in this research that government institutions change but slowly, and are constrained by a narrow set of values and lengthy history. As a consequence, there were many thoughtful comments made about a need for organizational change that will permit some new, creative and cooperative approaches to be adopted and vulnerability reduction to become a priority. Particularly, it would be advantageous if the political leadership could begin to structure a vulnerability reduction strategy in consultation with other stakeholders; clearly this would require sufficient funds and resources be made available to both government and communities. The ultimate goal might be to develop and implement a shared vision of resilient communities throughout the Red River Basin.

7.6 Contribution of the research

The results of this study have both a theoretical and conceptual significance. The review of floodplain management decision-making, and findings related to community and institutional

perspectives and values, highlighted current practices in floodplain management and some of their inherent weaknesses if community resilience and vulnerability reduction are goals. The study builds on past critiques of floodplain management in Canada; specifically, there has been a call to promote a culture of flood preparedness and flood resilience, particularly since the disastrous 1996 Saguenay and 1997 Red River Basin floods (IJC, 2000b; Shrubsole, 2000). This research confirmed the need for such cultural change. It showed clearly that community and institutional perspectives and values related to flood risk and mitigation - dependent as they are upon a complex mixture of cultural, political, and economic variables- need to be challenged if communities are to become more resilient to floods and other hazards. This study showed that systemic change will be necessary - at multiple scales, and with strong leadership. Otherwise, status quo decision-making will continue and vulnerability to flood will be attenuated as poor decision-making practices continue.

This research makes several theoretical contributions. A contribution to hazards theory was made through clarification of how communities have adjusted to the flood threat in the Basin through social, economic, and political processes which have increased vulnerability. Hazards research particularly concerns itself with the search for explanations for adjustments to the risk of future disasters (Mileti, 1980). This research presented a number of community and institutional values, attitudes and motivations that directly impact preferences for certain types of mitigation approaches and preferences for certain decision-making processes. Bogard (1988) argues that mitigation-related research has been oriented to viewing mitigation as only beneficial, with limited critical assessment of how it may cause future harm. This research critically viewed past and current practice within the Red River Basin.

Contributions to conceptual knowledge were made through increased understanding of the progression of vulnerability in the Red River Basin as illustrated in Figure 7.3.1. This framework, developed from the findings of this case study, adapted the PAR model of Wisner et al. (2004) and Blaikie et al. (1994) which was presented in Chapter 2. The application of the model within the context of developed rich nations whose economic, social and political circumstances differ from those of poorer nations was a unique application. It revealed that their framework - which shows a progression of root causes, dynamic processes

and unsafe conditions in the construction of vulnerability to hazard - was a useful tool in this context. It was seen that many of the contributors to vulnerability in the Red River Basin are less related to a lack of financial or livelihood options at household levels [i.e. assets in Blaikie et al.'s (1994) original model] as they are to vulnerability-exacerbating attitudes and motivations at the community and institutional level. The relationships between these attitudes and motivations, how they influence how decisions are made, and ultimately link with vulnerability were explored at length. Problematic attitudes and beliefs that were identified in the research included, for example, the general perception that vulnerability reduction is the purview of government agencies, that government will respond to flood damages by providing large amounts of financial resources to restore a community to pre-flood status, a lack of commitment to multi-objective multi-agency basin wide management approaches, and a preference for structural solutions to flooding over changing human behavior in the floodplain.

In critically assessing mitigation policies and strategies in the Basin the most recent conceptualization of vulnerability was adopted and applied. Mitigation and floodplain management actions in Manitoba fell short of idealized vulnerability reduction perspectives by failing, among other things, to manage risk within longer time frames (particularly a multi- generational focus) (Mileti, 1998), failing to address equities (Beatley 1999; Jones and Shrubsole, 2001) such as those between rural communities and urban, neglecting community participation and community capacity building (Oliver-Smith 1999b; Pearce, 2001), and using what Brown and Damery (2002) refer to as 'institutional treatment of risk' (2002, p. 423) meaning that institutions such as government agencies construct knowledge related to flood risk and relay it to the public in ways that fail to acknowledge the many uncertainties in flood management.

The findings of this research also confirmed the contention of Tobin and Montz (1997) that changes in values and attitudes towards flood vulnerability need to happen at all levels of society; they emphasize the important role of administrative levels of society where, they claim, a shift in perception and attitude is necessary to instigate widespread change in hazard-related behavior. They further suggest that the greatest challenge is a redefinition of

hazards as a 'normal' part of society, and encouraging people to reconsider and change their behavior. Given that flooding happens regularly in the Red River Basin, yet people maintain largely disengaged from the issue, it would seem that anything less will fail to successfully address vulnerability over the long term.

Another valuable empirical contribution of this work was in an approach that looked at linkages between flood management decision-making and the vulnerability of communities. More typically, research has tended to focus on the success of measures in preventing or minimizing losses (as determined with traditional quantitative measures) rather than upon decision-making as a contributor to vulnerability. This study sought to identify and understand sources of vulnerability that are manifest in decision-making and choices made with regard to mitigation measures, rather than reducing vulnerability to several indicators, quantitatively defined.

It also became obvious in the analysis that vulnerability in the Basin has been compromised by lack of community participation, and identified social and political barriers that prevent the expansion of mitigation options and more sustainable floodplain management practices. Pearce (1997) notes the importance of moving communities towards increased resilience to hazards through local assessments of vulnerability that are 'politically legitimate.' The findings of this research suggest that there is much work to be done before local communities would be sufficiently empowered and proactive with regard to local flood vulnerability reduction.

The use of photography in this context was a successful innovation. It primarily established a process by which participants had to thoughtfully reflect and select what to photograph in capturing important community characteristics and values, and to find a way to inform about flood vulnerability at a community level using discrete images. The interviews and group processes that followed also deepened the researcher's understanding of community dynamics, fears, beliefs and judgments about flood vulnerability and exposed some of the community dynamics and conflicts that exist in relation to flood risk. Vulnerability studies to date have been criticized for a lack of data on these very factors as potential contributors to

hazard vulnerability – namely, community dynamics, perceptions and priorities (Yodmani, 2001). This research has helped fill in this gap through some of the qualitative community data collection and interpretation.

At the local community level, this research also provided participating communities with an archive or poster of photographs and commentary from interviews and focus groups. These captured what participants had shared about their community priorities, values, beliefs, attitudes, and actions related to vulnerability to flood. It offers a starting point in discussions of community futures in the context of flood risk. The recent disaster literature (Mileti, 1999; Pearce, 2001; PERI, 2001) iterates the importance of community level communication and grassroots involvement related to floodplain management decision-making as a means of creating more disaster resistant communities. And, according to Beer and Hamilton (2002), helping communities to generate and share knowledge about natural disaster management is an important step in ensuring sustainability. It can be hoped that the posters, now housed in the respective communities, has offered some impetus for community level vulnerability discussions. The high level of interest and dialogue about the topic of vulnerability during the focus groups conducted in this research suggests that that there are ways of engaging the public and raising public consciousness about flood risk in a way that is meaningful to local people.

It should also be noted that the results of this research have implications for the discussions of sustainable floodplain management (SFM) approaches that permeate the broader literature. The analyses of vulnerability in this research suggested that there may be neither the social nor political environment as yet to advance significantly the goal of SFM. As noted in previous chapters, commitment of resources and development of tools to capture less tangible costs and benefits related to mitigation actions, and to address social impacts of decisions, lag far behind the rhetoric. Fundamental to SFM is a "change in attitude in which a willingness to take on greater personal responsibility for mitigating flood losses steadily replaces undue reliance on state provision and a culture of blaming the state when losses occur" (Werrity, 2006, p. 21). Basin communities and institutions continue to project old attitudes.

Finally, this research offers some insight into how communities and government might respond to the 'newer' risk of global warming and climate change. This research in the Red River Basin suggests several challenges to encouraging proactive responses to the threat. The first relates to the evidence here that development goals and economic growth are given high priority in the Basin even in the face of a known risk, i.e., flooding. It is unlikely perhaps that a seemingly more remote risk will alter development and economic growth values. It has been stated in other literature that people may be remarkably tolerant of risk when those risks yield significant social benefit (Mythen, 2004). In this case, could global warming not be perceived as a 'manufactured risk' (Mythen, 2004) that people might view as a necessary evil in order to maintain their lifestyle?

It is also likely that, given people's preferences for technological approaches, that they may assume that global warming will ultimately be dealt with through technology. This is likely reinforced by the fact that the issue is primarily debated within the scientific and governmental communities - not public venues - and it is conceivable that, like the findings in this study, people will assume that any risk - as has been the usual case in Canada- will be managed by scientists and experts.

It is also doubtless easier to remain complacent in a context where the experts themselves are indecisive about both the nature and extent of the threat of climate change. People's attention to the global warming issue will be moderated by the context of their relationship with government as government takes leadership on this issue. Findings in this research suggest that government and their experts have a credibility (trust) problem that makes their ability to influence the public questionable. This is even more likely to be true given that the climate change scenario also does not appear as an imminent threat, nor is it in the range of people's experience. These variables - lack of experience and immediacy - tend to simply lessen attention to threat (Mythen, 2004). Finally, it would seem unrealistic to expect that a 'community' (in the broadest sense) will embrace and prepare for a threat that is removed in time, removed in place (i.e., likely to impact more vulnerable regions of the globe first) until it recognizes the need to proactively address more immediate concerns such as local flooding

- for which there is a historical record and cultural memory. The issue of vulnerability to global climate change will likely only become a prominent issue in this context when the consequences are more tangible and/or when there is a shift in social values to incorporate vulnerability reduction in all community decision-making.

7.7 Final comments

Flooding problems in the Red River Basin will persist. The likelihood is that there will be more challenges to be faced as resources are depleted, populations increase, climate change impacts are more evident, and rural communities struggle with many social and livelihood changes that impact their resilience. However, vulnerability approaches offer not only new ways of conceptualizing the problem of flood management but keys to the solution. Hazards that are in part human-made can also be ameliorated by better, and wiser, decisions. This research challenges Basin residents and decision-makers to better anticipate the consequences of their actions in the floodplain, and to make vulnerability reduction a societal value.

It was evident through this research that the social construction of vulnerability is a significant contributor to the persistence of flood vulnerability in the Basin. This study has shown that social factors and processes such as political ideology, values, and the historic roles of government in risk reduction and disaster recovery - and associated beliefs and assumptions - have impacted how vulnerability to flood hazard is generally perceived at both a societal and community level. These perceptions have in turn determined the nature of mitigation activities, who participates in flood management decisions, and who is seen as responsible for flood risk management. The social construction of vulnerability in the Basin was also seen as linked to and responsive to economic forces and rural livelihood change, and the distribution and concentration of wealth in urban centers. These are factors that are in turn linked to power relations within the Basin, and dictate in some measure whose interests dominate in decision making and the distribution of resources for vulnerability reduction.

Reduction of vulnerability to flood therefore cannot be attained without social change; namely, change in widely-held beliefs about vulnerability and change in the preferred practices to reduce flood risk. Specifically, adopting a vulnerability reduction perspective means that as citizens, we do not make assumptions that some one else will be responsible for ill-conceived actions in a floodplain, that someone else will pay for our poor choices, or that we should be allowed to promote any and all economic growth and pass on the negative consequences of that growth to future generations. Most importantly, we must insist that vulnerability to various hazards is an issue worthy of ongoing scrutiny and cooperative planning, so we might improve our decision-making in hazardous zones and utilize our capacities to cope and adapt effectively over the long term.

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APPENDIX A: COMMUNITY SURVEY

Community Organization and Perspectives on Flood Vulnerability

1. Introductory Question

i. Did you live in Emerson during the flood of 1997? Y N
[If yes, proceed to interview schedule]

2. Perception of Community

i. How long have you lived in Emerson? _____yrs

ii. What are your reasons for choosing to live in Emerson?_____

_____

_____

iii. Do you feel secure living in Emerson? Y N other comment?_____

Why or why not?

_____

iv. What characteristics does this community have that you feel *helps* it in coping with the flood risk?

_____

_____

What characteristics might *prevent or hinder* the community from coping effectively with the flood risk?

_____

_____

vi. Is it important to you that other community members share your values? Y N

v. If YES, how important is it? Very Somewhat Slightly

If YES, what are some of the key values you are referring to above?

_____

3. Kinship

i. Do you have any other family members, other than those living in this household, that live in Emerson? Y N

ii. Do you have extended family living in Manitoba but outside of Emerson? Y N

If YES, where?

_____

_____

iii. Do you have close friends in Emerson? Y N

4. Information Exchange

i. How do you generally find out about events or activities important to the community?

(TV (show?); Radio (show?); Newspaper (type?); Local newsletter (type?); Internet (site?) Other?

_____

_____

_____

ii. Are there particular places where you can go in the community to find out information relevant to Emerson; that is, the "news"? Y N

If YES where? Store; Post office; Garage; Bulletin Board; Church; Other?_____

_____

iii. Does the local government provide information on important or emerging issues relevant to Emerson? If so, how?

_____

_____

iv. Do you get any information or updates on your council, MP's, or MLA's activities? Y N

If YES, how?

_____

_____

5. Group membership / participation

i. Do you *belong* to any community-based groups/organizations? Y N

ii. If yes, list (up to three primary) group(s) that you belong to, state their (its) purpose(s), and how long you have been a member.

GROUP/ORGANIZATION	PURPOSE	YEARS OF MEMBERSHIP

iii. Are you aware of any *other* community-based groups/organizations to which you don't belong?_____

iv. Are there reasons that you don't participate in these other groups?_____

_____

v. Have you ever attended a meeting held by:

a. The Municipal Council? Y N

If YES, why did you attend?_____

_____

b. Any other type of government meeting? Y N.

If YES, which one(s)? _____Why did you attend?_____

_____

vi. Who would you say the "leaders" are in your community, and why? (include yourself if appropriate)_____

_____

6. Flood Risk Mitigation

i. Did any of the groups/organizations that you are involved in play a role in responding to the flood of 1997? Y N

If YES, could you briefly describe that role?

_____

_____

_____

ii. Did you personally participate? Y N

iii. In addition to any mentioned above, are you aware of community-based groups/organizations that *did have* or *now have* a **mandate** to deal with flood related issues? Y N

If YES, please explain

_____

_____

iv. Do you have knowledge of any flood mitigation activities (completed since 1997, or proposed) with the potential to impact Emerson? Y N --- (**If no**, skip next question)

If yes, also answer the following…please rate what you consider to be your level of understanding about the proposed projects below: 4 means you believe you have a **high** level of understanding; 3 means you have **some** understanding; 2 means a **little** understanding; 1 means almost **no** understanding.

• **Town dyke**	**1**	**2**	**3**	**4**	**NR**	**R**
• **The Ste Agathe detention structure**	**1**	**2**	**3**	**4**	**NR**	**R**
• **The expanded Winnipeg floodway proposal**	**1**	**2**	**3**	**4**	**NR**	**R**

v. Are you aware of any other activities to reduce flood damage in Emerson? Y N

If YES, explain

_____

_____

vi. How did you learn about these proposed projects? (e.g., news/media; meeting; mail; _____;_____)

vii. Are you aware of community members being consulted about flood mitigation activities?
Y N

If YES, **how** did this happen, **who** was consulted, and **when**?

_____

_____

_____

viii. Have **you** participated in any flood plain management/planning activities related specifically to Emerson? Y N If so, how have you participated?

_____

_____

ix. Are you aware of any Emergency Response Plan for the town in the event of another flood?
Y N.
If YES, please rank how familiar you are with this Emergency Response Plan
very familiar **somewhat familiar** **slightly familiar** **only aware of its existence**

x. Do you have concerns regarding your *personal* flood risk now? Y N
If YES, what are they?

_____

_____

xi. Do you have concerns about your *community* related to the flood threat? Y N
If YES, what are they?

_____

_____

7. Vulnerability

i. Using the following scale rate how vulnerable you felt in 1997 (**4** means **very** vulnerable, **3** means **somewhat** vulnerable, **2** means a **little** vulnerable, **1** means **not** vulnerable).
4 3 2 1 NR R

ii. Rate how vulnerable you now feel to flooding (4-very; 3-somewhat; 2- a little; 1-not).
4 3 2 1 NR R
What, if anything, makes you now feel vulnerable to flood?

_____

What, if anything, makes you now feel less vulnerable?

_____

iii. Where do you feel more emphasis or resources should be put now to reduce impacts from future floods?

_____

8. Demographics

i. **Gender**: Male Female

ii. How many people reside in this household? _____

iii. Do you currently work inside or outside of the home? Y N If outside the home, is your place of work located in Emerson? Y N If not, where is it? _____

iv. Are there any other individuals living in this household that work outside of the home? Y N If yes, where do they work? _____

v. Do any students live in this household? Y N If yes, where do they attend school? _____

vi. Do you identify with any ethnic group(s)? Y N If so, which one(s)?_____

vii. Which language(s) is/are spoken in this household? _____

9. Would you be willing to participate in a further more detailed study? Y N

10. Would you like to receive the results of this survey, and/or other information on this project? Y N

11. Are there any comments you would like to make regarding the research or the survey? Y N

_____

_____

_____

_____

* "NR" means "no response"; "R" means "refused"

APPENDIX B: DOCUMENTARY ANALYSIS FRAMEWORK

DOCUMENTARY ANALYSIS THEMATIC CONTENT
Document
Year
Location
Type of doc/authorship
notion of public safety
reference to equity/ social justice/procedural fairness
authority- assumed right to lead
sustainability/ sustainable communities
protect/conserve environmental resources
focus on scientific enquiry (compared to social)
focus on issues of social enquiry
technological solutions/ structural measures
nonstructural measures/ human management
evaluation of risk- tools (cost/ben?)
who should pay for mitigation? compensation?
facilitate dev't local organizations/ institutions re fpm
soliciting public input
critique of past practice
public tradeoffs presented? How?
communication style/patterns

APPENDIX C: KEY INFORMANT QUESTIONNAIRE

Participant Code

ANSWER OUTLINE FOR INSTITUTIONAL KEY INFORMANT INTERVIEWS:

Core questions for key informant interviews
1. a) Describe the nature of your agency's/community's involvement in floodplain and flood management, including any mandate or guidelines that dictate your involvement. b) Also, staff hours and funds allocated to these issues if you have this information [targets values and areas of responsibility]. c) Describe how your agency works with local communities (with whom? frequency of meetings? barriers?)

2. a) What is the process for making and influencing mitigation decisions from your point of view?

   b) Who is involved? [targets actual decision-making processes]

3. a) What is your perception of how vulnerable Basin communities are to flood?

   b) What variables do you think most influence the level of vulnerability? [perception of vulnerability]

4. a) Can you describe what you believe would be the ideal process for making mitigation decisions?

b) Do you plan to include other stakeholders/community residents?

c) And if so, how? [reflects values, perception of community capacities, and attitudes towards public participation in decision-making]

5. a) What do you believe are the biggest barriers to sustainable floodplain management, and why?

b) How would you address these barriers? [reveals informants' perceptions of how to improve decision-making process and increase sustainability]

6. What means/mechanism does your agency/community use in determining whether a plan of action to reduce vulnerability should be supported eg. cost/benefit? [basis for the judgments; manifest values]

7. a) What do you believe are the chief priorities of the communities affected by your flood (floodplain) management decisions?

   b) How have you come to understand local values [communication of values]?

8. What types of ethical judgments, if any, have you felt required to make in addressing flood management issues in the Basin? [explicit exploration of values]

Additional questions (added post document analysis)

9. a) If you were to anticipate future changes to how mitigation is done in the Basin and particularly the role of communities/ residents in influencing mitigation actions relevant at a local level, what changes might those be?

b) Has your agency (or your role) experienced changes, and if so, what types?

c) What do you believe has been the cause (or at the source) of any changes?

Prompts:
e.g., 1997 flood?
e.g., expectations?:
e.g., values?
e.g., litigation?
e.g., other?
e.g., education?

APPENDIX D: DOCUMENTARY ANALYSIS - DOCUMENT LISTING

Date	Author (s)	Affiliations	Name of Report/Document	Other comments
1951	E. Kuipers, hydraulic engineer	Prairie Farm Rehabilitation Agency	Outline of Programme on the Red River Basin Investigation	
No date- 1950's	Uncertain- government public relations document	The Story of one of Canada's Biggest Excavation Projects: 'The Red River Floodway'	The Story of one of Canada's Biggest Excavation Projects: 'The Red River Floodway"	
1951	Greater Winnipeg Dyking Board		Final Report on Activities of the Greater Winnipeg Dyking Board of Inception July 10/50 to Oct. 1/51	
1956	Lakes Winnipeg and Manitoba Board		Memorandum: Manitoba Water Resources Investigation Outline of a Programme	Report on needed measures for flood control on lakes and major rivers
1963	W. M Baker- paid consultant	Park and Recreation Planner from Toronto	Provincial Responsibilities in the Development of Park Potentials of the Winnipeg Floodway	
1966	Office of the Provincial Coordinator	Manitoba Emergency Measures Organization	Manitoba Flood Fighting Plan	
1968	Planning Dept. (Manitoba)	Province of Manitoba	Effect of Lake Winnipeg Regulation on Flood Damages	Report for the Water Control and Conservation Branch of Manitoba Water Commission
1970	G.E.Grippen and Associates Ltd.- consulting engineers		Report on Lake Winnipeg Regulation	For the Minister on feasibility of Lake Winnipeg regulation, control of periodic flooding
1973	Planning Division- Department of Mines, Resources and Environmental Management	Province	Cooperative Development of the Pembina River Basin	Study of costs, flood control, etc.
1974	Department of Mines, Resources, and Environmental Management	Province	Flood Control: Red River Floodway and City of Winnipeg Dikes	Specifications on floodway and dikes

Date	Author (s)	Affiliations	Name of Report/Document	Other comments
1974*	Manitoba Water Commission	Province	Terms of Reference for	Briefs for Minister
1974	Manitoba Water Commission	Report to Province	Hearing of the Manitoba Water Commission: Red River/Turnbull Drive Briefs	Hearing Briefs re flooding of Red River Drive and Turnbull Drive communities south of City
*1976	Manitoba Flood Assistance Board		Country and City Flooding 1974-1975-1976	Report for Minister of Mines
*1977	Manitoba Water Commission	Report to Province	The Manitoba Water Commission: A Review of Flood Fighting Activities	For the Minister Report is result of public hearings in Brandon and Winnipeg to develop new strategies re flooding
1978	Planning Board (Winnipeg)		Flood Damage Reduction Study of the Red River in the Rural Municipalities of Ritchot, McDonald, Hanover, Ft. Garry and St. Vital	Report for Manitoba Mines, Resources and Environmental Management : Water Resources Branch Detailed flood protection costs of community dikes
1979	Water Resources Branch	Province	Lower Whitemud River and Big Grass Marsh Flood Control Study: Phase II Report	Studied 6 single purpose flood control schemes
1979	Unclear*		Major Diversions in Manitoba	Outlines purposes of major diversion projects- flood control, etc.
1981	Ad Hoc Task Force on Manitoba Flood Mitigation Projects: Canada-Manitoba	Provided to Canada-Manitoba Flood Damage Reduction Steering Committee	Report on Manitoba Flood Mitigation Projects: Red River Valley Ring-Dyke Communities (Carmen-Ste.Rose du Lac-Gimli)	Summarizes engineering and economic evaluations of 8 dikes
1981	Conservation Districts Section, Water Management Services, Water Resources Branch	Province	Canada-Manitoba Flood Damage Reduction Program: City of Winnipeg and Additional Interim Flood Risk Zone Mapping Study	Related to Flood Risk Area Designation and Mapping

Date	Author (s)	Affiliations	Name of Report/Document	Other comments
1987	Charles Howard and Assoc. Ltd.	For RM of Dufferin	An Integrated System for Flood Control: Carman, Manitoba	Purpose to look at cost effective water management measures and flood relief for town of Carmen
1987	Town of Morden		The Town of Morris- Submission to the Steering Committee: Canada-Manitoba Flood Damage Reduction Program	Town's concerns expressed about flood designation
1988	Water Resources Branch	Province	Water Management Issues	Includes wide range of issues- drainage, regulation, flooding
1997	International Joint Commission	Ottawa and Washington	Red River Flooding: Short-Term Measures: Interim Report to the IJC	Purpose to analyze causes and effects of 1997 flood and recommend ways to reduce impacts in future
1998	Manitoba Water Commission		An Independent Review of Actions Taken During the 1997 Red River Flood	Report to Minister of Natural Resources Includes research, public consultation and independents' review of technical issues
1999	Canada-Manitoba representatives- workshop	Province and Federal Government	A Strategy for Reducing Flood Risk in the City of Winnipeg: Report of the Technical Workshop on Flood Risk Management	Report on status of flood protection for Winnipeg
1999	Red River Floodway Operation Review Committee		Review of the Red River Floodway Operating Rules	Recommends changes to operations Multi-stakeholder members on committee- included local knowledge
1999	Canadian Water Resources Association (CWRA) - a compilation		Red River Flooding: "Decreasing our Risks"	A collection of 30 presentations on 1997 flood issues
1999	KGS	Funded by IJC, Winnipeg, Province of Manitoba	Flood Protection for the City of Winnipeg- Phase 1	Lists vulnerabilities and inadequacies for overall system protecting City

Date	Author (s)	Affiliations	Name of Report/Document	Other comments
1999	KGS	Funded by IJC, Winnipeg, Province of Manitoba	Flood Protection for the City of Winnipeg-Phase 2	Lists mitigation options, costs of flooding, the 'socially justifiable' limit for the design flood
Compilation of reports 1952-1999	Dyking Commissioner Greater Winnipeg Dyking Board		Annual Report of the Dyking Commissioner	Compilation of a series of annual reports from 1952-1999 on City flood control works, appraisal of diking system, comments re development, etc.

* information was unclear as to authorship or date on the document

APPENDIX E: PHOTOGRAPHY INTERVIEW QUESTIONS

Photography exercise

January, 2004-2005

PERSPECTIVES AND EXPERIENCES IN A COMMUNITY AT RISK FOR FLOODING

Core questions for participants during interviews related to photographs

1. Describe the photographs and what they mean to you. What is most important about what you chose to represent in the photos?

2. Do you feel that the flood risk poses a threat to what you depicted in the pictures (discuss each)?
   If not, why not? If so, in what way? Do you have past experiences or special knowledge that you can relate to explain your perspectives?

3. What type of vision do you hold for your community? Has there been any community level visioning done to your knowledge? If so, can you describe the main characteristics of that vision, and your reaction to those priorities and goals?

4. Do you feel the flood risk poses a threat to the vision you, or the community, has of the future? If so in what way? Can you describe possible future scenarios and what is contributing to the achievement of those visions?

5. What actions (if any) have been taken to reduce your community's vulnerability to flood? Have they made you feel less or more vulnerable to threat? Explain that assurance (or lack of)?

6. How are the decisions made on how to best protect your community from flood? Do you feel a part of that process? Do the decisions seem in line with your personal values? Explain.

7. Who made/makes the decisions on what actions to take? Explain.

8. What do you believe would contribute to better decisions to reduce local vulnerability to flood? (provide information on both structural and nonstructural measures to respondent for them to consider- dikes, warning systems, individual homes flood-proofed, compensation arrangements, insurance). Actions (if any) that have not been done that ought to be examined?

APPENDIX F: SOCIODEMOGRAPHIC INFORMATION

Community Participant Information

1. Community: **Emerson**_____ **Ste. Agathe**_____

2. Name:

3. Address:

4. Gender: **Female**_____ **Male**_____

5. Length of time living in community: _____**years**

6. Type of dwelling: **Home**_____ **Apartment**_____ **Other**_____

7. In community during 1997 flood? Yes____ **No**_____

7a. Extent of damage to home in 1997 (if applicable)

_____

_____

8. Age Category:

1. ___18-24
2. ___25-34
3. ___35-44
4. ___45-54
5. ___55-64
6. ___65-74
7. ___75-84
8. ___85 or over
9. ___No response

9. Highest level of education achieved:

1. ___Some School
2. ___High School graduation
3. ___University or college (no graduation)
4. ___University or college degree
5. ___Other
6. ___No response

10. Religious Affiliation (if any):_____

APPENDIX G: CONSENTS

Community survey: Introduction and Consent

INTRODUCTORY STATEMENT

My name is ..... I am a student/professor at the Natural Resources Institute, University of Manitoba.

The purpose of our research is to improve understanding of community processes and values that impact floodplain management. We want to explore these issues through interviews with community members. The objectives of the study are to:

1. identify which groups/organizations and which activities contribute to people's sense of identity within their communities
2. identify what values underlay the sense of community identity
3. determine what groups/organizations influence perceptions of and values related to the floodplain
4. determine how the identified groups/organizations influence people individually or collectively to make decisions given the flood risk

The interview will take approximately forty-five minutes and will cover a wide range of topics about your knowledge and experience within your community and during past flood events. You are under no obligation to participate in the interview. If you choose to participate please feel free to discuss your opinions openly and freely. You can, at any time, end the interview or refuse to answer individual questions. In the event that you do not wish to answer a specific question, simply respond "no comment". Your responses will be held in strict confidence, and the results of the study will be aggregated (grouped) with no reference made to specific participants.

This research is part of a larger project titled Flood Research Partnership: Promoting Stakeholders' Participation in Sustainable Flood Management in the Red River Basin. It is being funded by the Social Science and Humanities Research Council (SSHRC) through a 3 year Community-University Research Alliance (CURA) grant. The larger project involves researchers from various institutions working together, and in partnership with communities, to develop some best practices for sustainable floodplain management in the Red River Basin and elsewhere. These surveys are one of the tools being used to help improve understanding related to floodplain management, particularly at the community level, and move towards more sustainable management in future.

The University of Manitoba Joint Faculty Ethics Review Board has approved this proposal. If you have any questions or concerns related to this matter, please contact Ms. Margaret Bowman, Ethics Secretary, Office of Research Services, University of Manitoba at (204) 474-7122.

CONSENT: COMMUNITY PHOTOGRAPHY RESEARCH

Research Project Title:

Human values and Vulnerability Reduction: Flood Mitigation Decisions in the Red River Basin

Researcher: Toni Morris-Oswald
Natural Resources Institute, University of Manitoba
Tel.: (204) 474-9455
Cell: (204) 227-7583
Supervisor: Dr. John Sinclair
Professor, Natural Resources Institute, University of Manitoba
Tel.: (204) 474-8373

The consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and understand any accompanying information

The purpose of the research is to improve our understanding of the relationship between human values held by residents of communities within the Red River Basin and the types of measures taken to reduce vulnerability to flood. The types of structural and nonstructural mitigation activities historically undertaken in the Basin will be reviewed, including how those decisions were made, and what people (both decision-makers and citizens) believe about those measures. The research will also evaluate whether the decisions made (and how they are made) are likely to reduce vulnerability in the long term, build more resilient communities, and if the mitigation actions reflect the values and priorities of community residents. At the conclusion of the study, recommendations will be made of how to improve use of both structural and nonstructural measures in reducing vulnerability in this context.

Part of this research is being conducted within small Manitoba communities south of the City of Winnipeg. We are interested in your perspectives and your experiences as a community resident living in a community that is at risk from large-scale floods. We are investigating what values and priorities community residents have, including identifying what things they most value within their community and why, what threat the flood risk may or may not pose to what is valued, what visions people have for their community, and what actions (if any) have been taken to reduce vulnerability to flood.

Should you choose to participate in this study, we will require several hours of your time over a span of several months.

Once you have agreed to participate, there will first of all be an arranged meeting of all community participants, eight to ten people in all. Note then that other community participants will know of your participation. The meeting will review the research, and discuss and clarify your role. The meeting will likely be roughly one hour (or as long as necessary for clarification purposes). You and other community members will then be provided with disposable cameras, and asked to take a dozen photographs of those 'things' you most value within your community. Details of how to do this will be provided at the time. You will also be given at least two weeks to do this at your leisure, during which we will check in with you by telephone to address any questions you might have. You will also be given several copies of a form on which to get signatures of any people whom you decide to photograph (or the signatures of a parent or legal guardian for anyone under the age of 18). You must get their permission.

We will collect the films from you for development, and arrange an interview time to meet with you individually to discuss the photos. You will be given one copy of all the photos you have taken, and one copy will be used in the research. The interview will be an open dialogue between you and the researcher guided by several questions about the photos, your community, and the local flood risk. Interviews will likely be about 1.5 hours long. These interviews will be audio-taped with your consent. We may also wish to use some of the

comments that you make about what you value, or about your community, in an archive of photos and comments that we will give to your community at the conclusion of the research. Actual audiotapes, or audio excerpts from the audiotapes, would not be provided to the community. We would provide only written excerpts we type from the interviews.

You will be consulted about the use of any and all photos and comments made by you that are used in the archive. No individual names will appear in the archive beside photos or comments.

After the interview about your photographs, you and all participants from your community will be asked to attend a focus group together several weeks later, in which some photographs and comments will be used to prompt a discussion about various community and flood management issues. Again, permission to use the photos and comments will be obtained first from those who made them at the earlier interview or through a later visit by the researcher. The focus group discussion which follows might include, for example, the values and priorities depicted in the photos, what the ongoing flood threat means for the community, and how mitigation measures do or do not reduce the sense of vulnerability to flood. Who took individual photos or made individual comments will not be revealed by research staff to focus group participants. You, of course, may choose to reveal those items that are yours.

All photographs, audiotapes and written records used will be coded and kept (stored) separately from your identifying information during the duration of the research. The materials will only be in the possession of the research team, and will be destroyed at the conclusion of the research with the exception of those contained within the archive for your community. Your photos and interview responses will be held in strict confidence by the team, and the final results of the research will be aggregated (grouped) with no reference to specific participants.

Finally, as a participant, we will ask if you would like a summary of findings from the research, in writing, to be sent to you at a later date.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights, nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the interview at any time and/or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

This research has been approved by the Joint-Faculty Research Ethics Board at the University of Manitoba. If you have any concerns or complaints about this project you may contact my supervisor or myself at the telephone numbers appearing at the beginning of the consent form, or by contacting the Human Ethics Secretariat at 474-7122, or e-mail margaret_bowman@umanitoba.ca. A copy of this consent form has been given to you to keep for you records and reference.

Signature of participant _____ Date: _____

Signature of researcher/delegate _____ Date: _____

* As a result of community input, audio and video recording procedures were not used.

CONSENT: KEY INFORMANT INTERVIEWS

Key informants consent

Research Project Title:

Human Values and Vulnerability Reduction: Flood Mitigation Decisions in the Red River Basin

Researcher: Toni Morris-Oswald

Natural Resources Institute, University of Manitoba
Tel.: (204) 474-9455

Supervisor: Dr. John Sinclair

Professor, Natural Resources Institute, University of Manitoba
Tel.: (204) 474-8373

The consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and understand any accompanying information

The purpose of the research is to improve our understanding of the relationship between human values held by residents of communities within the Red River Basin and the types of measures taken to reduce vulnerability to flood. The types of structural and nonstructural mitigation activities historically undertaken in the Basin will be reviewed, including how those decisions were made, and what people (both decision-makers and citizens) believe about those measures. The research will also evaluate whether the decisions made (and how they are made) are likely to reduce vulnerability in the long term, build more resilient communities, and if the mitigation actions reflect the values and priorities of community residents. At the conclusion of the study, recommendations will be made of how to improve use of both structural and nonstructural measures in reducing vulnerability in this context.

I would appreciate your participation in an interview of approximately one hour in which I will ask your thoughts on a series of questions related to floodplain management issues, and the role of your agency if applicable. If you are in agreement, I would like to use an

audiotape to record the interview. Otherwise your responses will be recorded on paper. Both tapes and written records will be coded and kept (stored) separately from your identifying information (name, agency etc.) Tapes or written records will be held in my office under lock and key, and will be destroyed at the conclusion of the research. Only my supervisor at the university (Dr. John Sinclair), a research assistant on the project, and myself will have access to the information collected. Your responses will be held in strict confidence, and the results will be aggregated (grouped) with no reference to specific participants (or their agencies if applicable). Also, as a participant, we will ask if you would like a summary of findings from the research, in writing, to be sent to you at a later date.

At the conclusion of our interview I will ask if you would be willing to participate in a second interview of similar or lesser duration at a later date, or if you prefer not.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights, nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the interview at any time and/or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

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Signature of participant _____ Date: _____

Signature of researcher/delegate _____ Date: _____

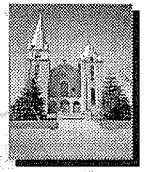
APPENDIX H: COMMUNITY POSTERS

Identity and Attachment

Church

'You can identify with the church, identify with your religion, identify with worship.'

It is 'the lifeblood of our community. People meet to worship, nourish spiritual needs.'

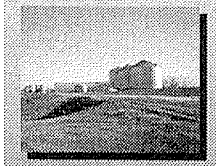


School

'In 1997 due to damages, the old part of the school was torn down, a new front part was added, and the back part was cleaned up...'

French cultural values

'French cultural values... are important ... the school in town is French so that children continue to learn French values.'



Family farms

'This is the family farm... The first generation farm was located along the river but they moved because of repeated flooding.'

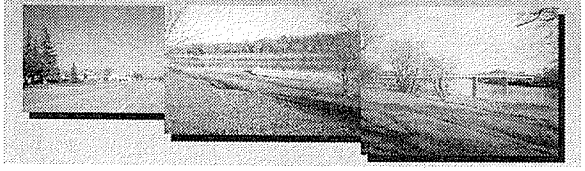
'In 1997... We needed a place to share experiences, bond as a community, to support each other.'

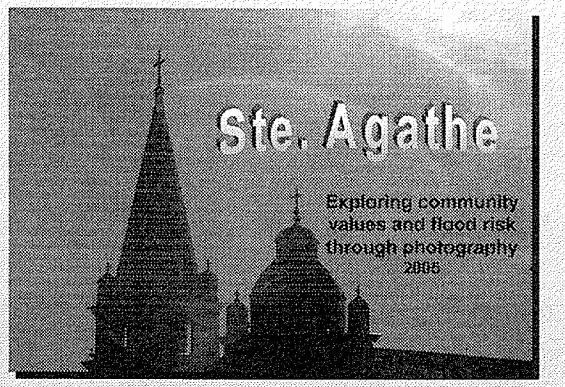
'The most important message is that we should never get complacent (about flooding).'

The Interpretive Center

The Interpretive Center means to 'educate (the) general public and schoolchildren regarding the Red River Valley environment... We are getting better at this, a better understanding of the river, and better able to protect ourselves.'

Ste. Agathe is a 'viable place to live... There is a need to put it (flooding) into perspective.'





The Red River

The river as a resource

'No dike impedes the view of the river in Ste. Agathe... We are in a very good position to develop a riverside park.'

'We should focus on the fact that, south of Winnipeg, we are the only community with an unobstructed view of the river.'

'During the 1997 flood, water was almost up to the bridge in places... The bridge is used as a water marker. Local people judge water height by the piers.'

Living with the river

'The kids are still finding things along the river... artifacts... bottles, beaded purse, parts of a stove...'

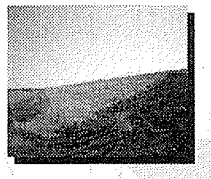
Floods change the face of a community

In 1997... 'A lot of the elderly left... The flood was too much for some elderly.'

Loss

'Expropriation, the term used by government, means (you) have to leave everything behind!'

Flood Vulnerability

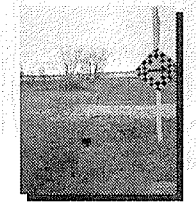


'My biggest concern is that there is no real dike. A core dike with a clay base is what we have. We were told a temporary dike would go there on top of the core dike... It's like an unfinished dike.'

'The dike is not high enough; it is lower than the train track which was overtopped in 1997.'

'We are draining tons of water from the west though culverts and pipes... This rationale "too much water, add more drains" is the problem.'

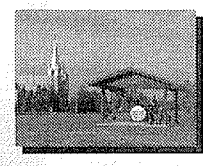
'There's always going to be a flood threat; 1997 showed us that it can happen.'



Decision-making to reduce vulnerability

'We had consultation meetings (but)... the meetings wouldn't change the outcome. People stated their concerns but nothing was changed.'

'Better decisions would come about from thinking positively, and thinking about what has been done to protect the town (since 1997).'



'We want the ear of government, want to organize ourselves more politically.'

Visions for a Viable Future

'I want young people to want to live and spend their lives here... I want the bilingual nature (of the community) to remain. Economically, we hope to continue to grow/prosper...'

(There is a hope for) 'new development and with it, some new people and a younger generation.'

Emerson Manitoba

Exploring community values and flood vulnerability through photography 2005

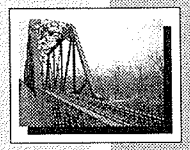
The Red River

'I like the fact that the river changes'... the river 'shows the power and massive forces of nature.'

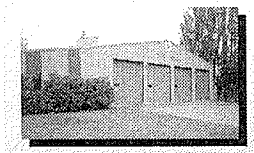
Judging the Flood Risk

'We look to the river in winter and spring to judge what will happen (with flooding).'

'People judge how high the water is by the brick rows on the center pier of the bridge... This is not the measure of the Province.'



Protective Services within the Community



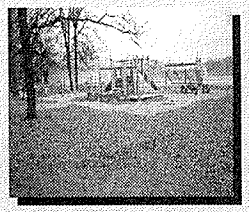
Fire and ambulance
'The fire hall represents vigilance regarding flood, and protection from hazard.'

RCMP
They 'ensure safety, security, and freedom of movement.'

Quality of Life

Recreational values

'There is lots of recreation in town'... Recreation was 'historically important to the town.'



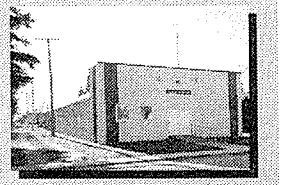
Park

It is 'well maintained, wonderful... open and easy to access... lots of hours available to the public.'

A Caring Community

'A community needs a school to have some semblance of a future.'

Supports for seniors



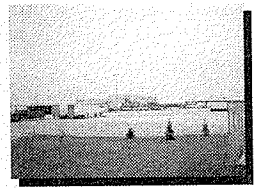
'Seniors are still members of the community even once they are unable to manage on their own.'

Worship

'Family and worship represent togetherness.'

There are 'dwindling congregations and therefore (monetary) resources.'

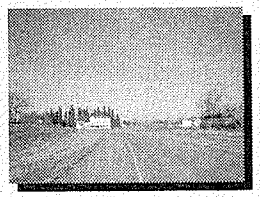
US-Canada Border Relations

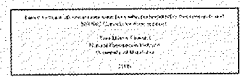


Two sides to the story

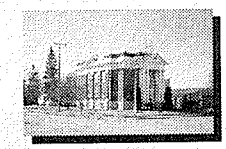
'Devil's Lake Diversion will result in more water and biotic contamination... we need to be more diligent... what if they flood or contaminate us and claim it is just an error?'

There is 'less freedom to travel across the border... there use to be more association (between communities) across the border.' That is a loss...

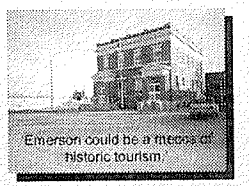




Valuing History

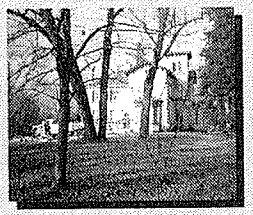


'Historic values are represented here, the *town hall* houses the library, recreation department, and the memorial for WW2.'



Emerson could be a mecca of historic tourism.'

Fairbanks mansion... 'It is being restored to its former beauty... to restore it back to its historical look.'

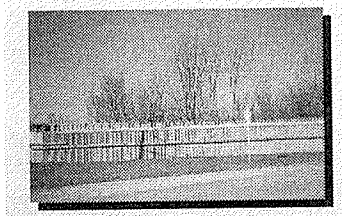


Remembering Past Floods

Old Telephone Office

The *telephone office* was '6 feet under water in 1950, and in 1966 was sandbagged... I had to climb over them to get inside.'

Living with the Flood Risk



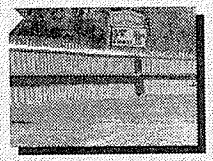
'The coffer dike is sinking into the river, and the riverbank needs stabilization.'

Flooding 'does pose a threat if we don't maintain the dike or take proper precautions under certain forecast conditions.'

Many Views

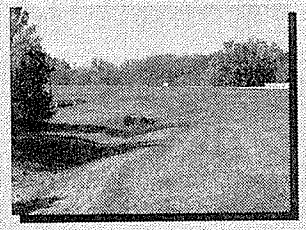
'The dike is the reason we are still here!'

'People have the wrong idea about Emerson being under water... rural people know better than urban people how to look after themselves in an emergency.'



'Flood definitely affects businesses. Even if the town doesn't flood, just the *threat* has effects.'

'An important reminder is that there are costs if you do things *but* also costs if nothing is done with regard to flood vulnerability.'



'The benefits of living here outweigh the disadvantages!'