Planning for Disaster: Assessing the Overland Flood Hazard in the Rural Municipality of De Salaberry

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OF

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Abstract

Overland flooding is a hazard that plagues many Rural Municipalities (RM) in Manitoba. It is a destructive, damaging hazard, which has the potential to disrupt and uproot the lives, businesses and communities of all those in the hazard area. Policy in Manitoba has focused on emergency response rather mitigating potential effects.

This study investigates the consequences of overland flooding, demonstrating how the lack of mitigation and preparedness contributed to the severity of damage in one rural municipality, namely De Salaberry. To measure the impact of overland flooding in the municipality, the physical characteristics of the hazard were examined. The influencing political, economic factors and social characteristics of the municipality were explored. The role of three key factors, namely existing emergency plans, availability of disaster financial assistance, and local government were analyzed.

The results of this study indicate that the local authority in the municipality requires adequate information about the hazard of overland flooding and regular education and training are critical to build their capacities and reduce their vulnerabilities. It is also imperative that mitigation strategies are adopted to prevent a continual cycle of disaster-damage-repair-disaster. Also, this research shows that disaster financial assistance does not encourage preventative change and exemplifies how assistance should come in the form of support to foster relationships between municipalities and government agencies to develop mutual aid agreements. Finally, this study demonstrates that more research is required to investigate how policy in Manitoba can be improved to better address municipal emergency management concerns.

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Chapter One: Introduction and Overview

1.1 Introduction

Flooding is a common feature of the Red River Valley region, exemplified by the regular flooding of the Red River itself. It is well documented and researched and consequently significant mitigation and emergency plans are in place. The effects of the Red River spilling its banks can be devastating to all those who live, work and play in its path. However, overland flooding is also a destructive, damaging hazard, which has the potential to disrupt and uproot residents in this region.

Overland flooding is caused by an extreme precipitation event of short duration with a relatively high peak discharge. Precipitation from such a high intensity event, which is typical of thunderstorms, tends to be very localized. Local river flows can rise several hundred times their normal flow in the space of a few hours when a high concentration of rain falls on a small area (Bryant, 2005). Yet, overland flooding tends to be overlooked when officials are planning for flood response. In fact, mitigation, preparedness, response, and recovery in the southeastern portion of Manitoba have thus far focused primarily on the Red River. This study investigates the impact of overland flooding in one rural municipality (RM), namely De Salaberry, which is in the heart of the valley. This study also shows how the lack of mitigation and preparedness contributes to the severity of damage caused by this type of flooding.

This introductory section describes the aims of the study, gives a brief overview of the study area, describes the study period, explains the type and source of required information, describes the type of analysis, and provides the organization of this study.

1.2 Aims

This study examines the overland flooding hazard in the RM of De Salaberry and assesses the RM's level of preparedness against the risks associated with overland flooding. An initial examination of a conceptual framework based on an integrated approach model by Tobin and Montz (1997) that is applicable to the overland flood hazard in the municipality will help determine future planning objectives. To measure the impact of overland flooding on the municipality, the following issues are examined:

- The physical characteristics of the overland flooding hazard
- Influencing political/economic factors
- Social characteristics and previous experience

An assessment of the amount and type of damage to the public sector as a result of overland flooding will also be examined. Due to the Public Information Act, information regarding damage to the private sector is not available. However, public sector data obtained by Manitoba's Emergency Management Organization (MEMO) and the municipality is analyzed and mapped by Section-Township-Range and dollar amount to illustrate where the damage has occurred and which areas are the most vulnerable.

Finally, this study assesses the contribution of three key factors to the severity of damage caused by overland flooding. This is analyzed by:

1. Examining current emergency plans for the municipality
2. Reviewing the availability of disaster financial assistance
3. Exploring the type of local government and the role they play in a flood event

1.3 Study Area

1.3.1 Location and Physical Environment

The study area is the RM of De Salaberry. This area is representative of the Red River Valley Region and permits the collection of data required for fulfilling the aims of this study. The area comprises 675 square kilometers and is located 42 kilometers south of the city of Winnipeg on Highway 59. Highway 23 transects the municipality from the west joining Highway 59. The RM was incorporated on January 2, 1883, and the 2001 Census records a population of 3227 people. De Salaberry borders the municipalities of Hanover, Stuartburn, Franklin, Mont-Calm, Morris and Richot (See Figure 1).

Figure 1: Municipalities Bordering De Salaberry

Source: Province of Manitoba (2006)

The municipality has one incorporated town, St.Pierre-Jolys, and seven villages, Otterburne, Carey, Dufrost, Ste. Elizabeth, LaRochelle, Barkfield and St. Malo (See Figure 2). The Rat River, Marsh River and Joubert Creek all pass through the municipality. The Rat River flows from the southeast corner of the RM to the northwest corner. The Marsh River flows through the northwest portion of the municipality and Joubert Creek originates from the east side of the RM, curving through the town of St. Pierre-Jolys and flows out of the north side of the municipality. The Rat River and Joubert Creek are the primary sources of overland flooding.

Figure 2: Towns and Rivers in the RM of De Salaberry

Source: Province of Manitoba (2006)

1.3.2 Population and Social Conditions

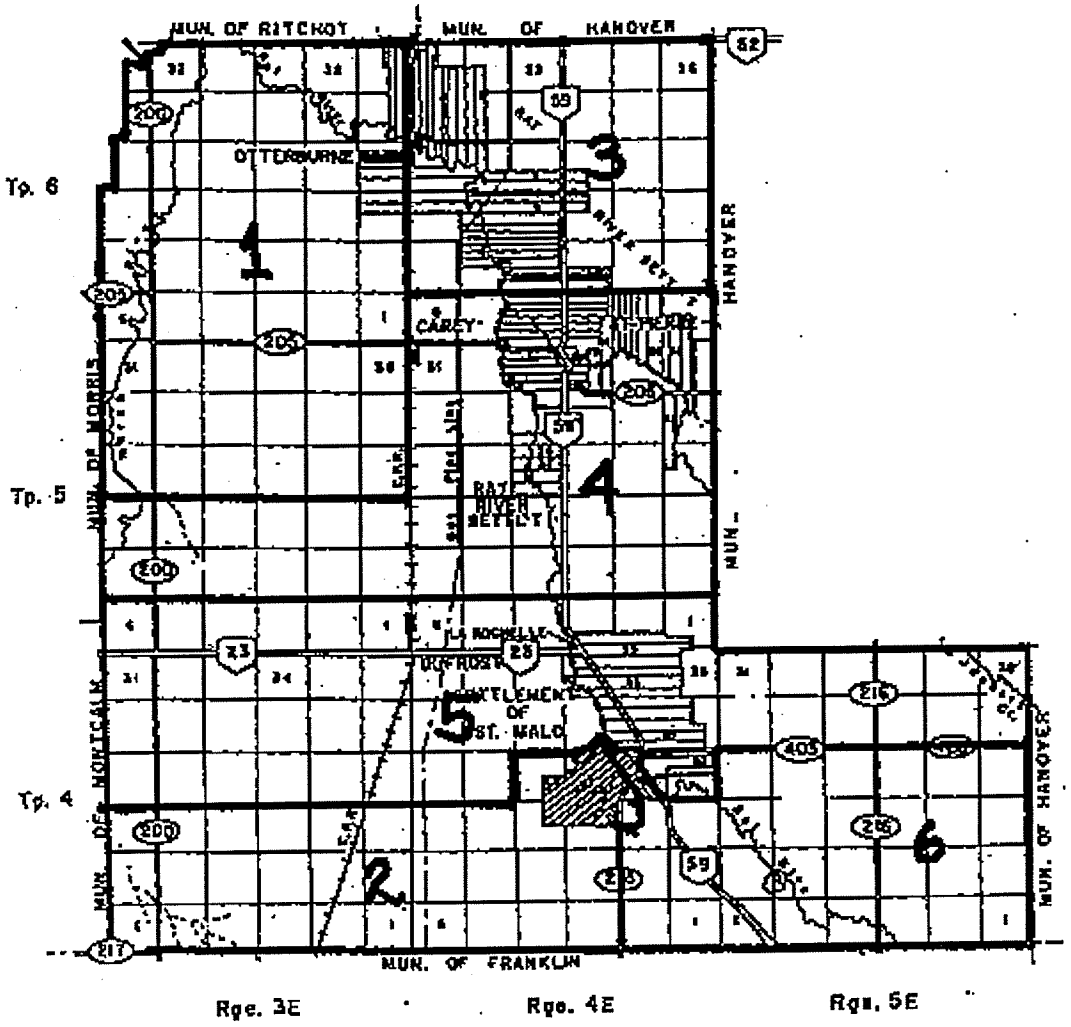
As of the 2001 Census, the total population of the municipality was 3227. The population has steadily increased over the past fifteen years. Just under fifty percent of the population falls in the working age cohort (25-64), with men earning an average of $25,180 annually and women earning an average of $16,021. The average income earned by both men and women in the RM is lower than the provincial averages. The number of

people who participate in the labour force in the RM is also lower than the provincial averages, due largely to the lack of available employment opportunities. The agricultural, health, education and manual labour sectors employ more than sixty-six percent of the municipality's workforce. However, most of these sectors are seasonal and unpredictable. In addition, an unfavorable summer season can make financial success a difficulty.

1.3.3 Local Authority

There is one reeve and six councilors in this area and these elected officials are in office for a term of four years. The reeve oversees the entire municipality, while the councilors are each responsible for their designated ward. There are three types of zoning in the RM, namely community zoning, district zoning and local council zoning. Figure 3 shows the make-up of the wards in the RM.

Figure 3: Wards Within the Municipality



Source: RM of De Salaberry (2006)

1.3.4 Utilities

The drinking water for all homes in the RM comes from a water treatment facility. Chlorine and potassium are added and the quality of the water is considered good. Sewage is treated by being pumped into a lagoon. Manitoba Hydro is the areas primary power source and communication is offered by Manitoba Telephone Systems.

1.3.5 Business and Professional Services

Accommodations: The RM offers one motel, one hotel, one rental cabin property, one bible camp and four campgrounds.

Automotive Products and Services: The services available in the municipality include one auto glass shop, two automotive repair shops, two body repair shops, one car wash, two towing services, three service stations and one tire sale and service shop.

Community Services: There are two daycare facilities, one Development Corporation, one chamber of commerce, one garbage disposal service, one Laundromat and one lumberyard. There is also an arena in St. Malo.

Contractors: There are many types of contractors in the area. They include one building contractor, one cabinetmaker, three electricians, one excavator, two heating and cooling contractors, one painter, three plumbers and two carpenters.

Food and Beverage Services: There are two grocery stores, one liquor outlet and five restaurants.

General Merchandising: There are two hardware stores, one sporting goods store one video rental store, one florist, one taxidermist and one horse riding stable.

Transportation: Morin Transfer is the only trucking service in the municipality and the nearest commercial airport is in Winnipeg. There is Grey Goose Bus Service from Coulombe's Store in St. Malo.

Health Care: There are 14 hospital beds available, three physicians, three registered nurses, four part-time nurses, one dentist, one chiropractor, one medical clinic, one public health unit and one ambulance service is provided.

1.3.6 Government Service

The RM of De Salaberry is home to one Natural Resource office. There is one elementary school with 111 students enrolled and one junior/senior high school with 63 students. The nearest university is the University of Manitoba. The nearest college is Providence College in Otterburne followed by Red River College in Winnipeg.

1.4 Study Period

A series of intense localized storm produced heavy rainfall in the RM of De Salaberry between June 9-11, 2002. Large volumes of water, which rapidly concentrated in both time and space saturated the soil in the RM and due to their inadequate drainage systems, the runoff water caused both the Rat River and Joubert Creek to spill their banks. This event was chosen as the study timeframe due to the record amount of rainfall measured in the municipality, the amount of damage it caused, and the reoccurring nature of the hazard in the RM.

1.5 Data and Sources

The process of mitigation, preparedness, response, and recovery is complex and varies from hazard to hazard. Since it is not feasible to study all of the factors affecting this process, focus is being placed on current emergency management plans, damage that occurs as a result of overland flooding, and the type and involvement of the local government.

Data concerning the characteristics of overland flooding including the stage (feet) and flow (cubic feet second) of recent overland flooding events, and the history of

overland flooding on both the Rat River and Joubert Creek were acquired from Manitoba Conservation's Water Branch. The data on current emergency response plans were obtained from the local municipal office in the RM of De Salaberry, while the guidelines for these plans was obtained from MEMO.

Information on the type and amount of damage that has occurred as a result of recent overland flooding events was derived from two sources. The municipal office in the RM has data on the amount of damage that was incurred by the public sector. The damage is classified by type, section-township-range, and dollar amount.

Statistical data on the demographics of the municipality was acquired from Census Canada and the municipal office in De Salaberry. The municipal office also has information on the local government.

Finally, informal meetings, attendance and participation at a local council meetings, and further discussions with the local government and public works officials aided in determining the vulnerabilities and capacities in the RM.

1.6 Organization of the Study

This study is organized into five chapters. This introductory chapter includes an overview of the thesis and details a comprehensive description of the study area. The second chapter discusses relevant disaster literature and discusses some concepts included in the theoretical framework. This is followed by chapter three which focuses on the conceptual framework of the study including the Tobin and Montz model. Chapter four examines the data and results of the analysis. Conclusions and recommendations are discussed and presented in chapter five.

Chapter Two: Literature Review

2.1 Introduction

There are some concepts in the disaster research realm that require clarification due to the different ways in which they are interpreted by researchers, practitioners, and the public. A review of disaster literature provides background for this study by examining the traditions in disaster research studies, discusses the many uses of the term disaster, and analyzing risk assessment. The remainder of the literature review will be organized by the disaster management continuum which consists of four phases: mitigation, preparedness, response and recovery.

2.2 The Disaster Studies Research Tradition

In 1945, Gilbert White pioneered geographical disaster research by examining the human response to flooding in the United States. White (1945) used a systems approach to comprehend why people live in hazard prone areas and how they manage with this hazard. The purpose of his study was to provide alternative solutions to river control schemes and he succeeded in bringing to light the social implications of disasters. Other geographers began to follow White and continued this type of work over the following 30 years, while other social scientists began to draw conclusions on the role people play in hazardous environments (Smith, 2004).

By the 1970s, studies on hazards and disasters had diversified. Engineers, geologists and natural scientists continued with their structural-based plans to mitigate the effects of disasters. Geographers, on the other hand, grounded their work in a hazard-based approach. They attempted to mitigate damages by including various human

adjustments such as traditional coping methods and the structural preventative measures that were used at the time. Sociologists employed a disaster-based approach and were attempting to understand the role of collective human behavior in a disaster situation.

By the 1980s, priority was given to understanding hazards in the developing world, with emphasis placed on their socio-economic position. It was during this period that vulnerability to disaster became a key concept of social scientists (Smith, 2004).

Today, the study of disasters is very fragmented. Despite the large amount of research being done, some of the basic concepts such as disaster, vulnerability and risk still await agreement on definitions. These terms lack fixed definitions primarily because of the differing ways in which natural and social scientists view the relationship between the environment and humans (Alexander, 1993). Natural scientists have retained their structural solutions approach, assuming an agent-specific model, where a geophysical event generates a disaster and the type and amount of damage is the result of environmental and social factors. Social scientists on the other hand, continue to examine the role humans play in contributing to the severity of a disaster (Smith, 2004).

2.3 Disaster Defined

For the purpose of this study, the following definition is used. Disaster as defined by MEMO is "any real or anticipated occurrence which endangers the lives, safety, welfare and well being of some or all of the people and which cannot be brought under control by the use of all the regular government services and resources." (Manitoba Emergency Measures Organization, 2006a)

The term disaster has a long list of definitions including:

In 1961, Fritz defined disaster as an accident, occurring in a certain space of time that affects a portion of society that results in losses to its members and physical environment, disrupting societal function.

Fritz's definition is too broad in its scope by explaining that "a portion of society" may be affected. In reality, when a disaster affects a small community, its effect is typically felt by everyone in the area. The effects may be physical/material, social/organizational or motivational/attitudinal.

In 1964, Burton and Kates defined disaster as an element of the physical environment that is harmful to humans, caused by extraneous forces.

Burton and Kates's definition is not broad enough. The assumption that disasters occur only "as an element of the physical environment" is categorically untrue. Disaster can result for reasons other than extraneous environmental forces. A plane crash, conflict and social upheaval can all cause disasters.

In 1969, Sheehan and Hewitt defined disaster as an event in which at least 100 people are dead, 100 people are injured or there is at least one million dollars damage.

Sheehan and Hewitt's definition of disaster may hold more value in a third world setting, however, in a country such as Canada, especially in areas in rural Manitoba, a disaster may occur without resulting in 100 dead or injured due to the spread out geographic location of most dwellings. Also, in today economy one million dollars damage is not very difficult to achieve. For example, it could easily result from one business destroyed by fire.

In 1977, Quarantelli and Dynes stated that a disaster is a societal crisis, identifiable in social terms.

Quarantelli and Dynes's definition implies that disaster may only be measured in social terms. While disasters can be said to be a societal problem or crisis, there are numerous factors missing from this definition including all physical and economic impairment.

In 2004, Smith declared that a disaster was an extreme geophysical event characterized by concentrated releases of energy, which represent a significant threat to human life and can cause major damage to goods and the environment.

Smith's definition is an updated version of Burton and Kates from 1964. Smith has included risk to human life, goods and the environment and expanded his definition to include geophysical events. However, for the purpose of this study MEMO's definition is the most useful because it includes the fact that a disaster "cannot be brought under control by the use of all regular government services and resources" (Manitoba Emergency Measures Organization, 2006a). This definition was chosen for the purposes of this study because it is the definition which the rural municipalities in Manitoba must use when planning for an emergency. Therefore is the most appropriate when assessing the overland flooding hazard in the RM of De Salaberry.

2.4 Risk Assessment

Although its roots can be traced back fifty years, the study of quantitative risk assessment is a relatively new one. It began with the concept of trying to link exposure to hazardous substances in the workplace and resulting adverse health effects. However, it

was not until the 1980s that risk assessment became accepted as a science with the first publication of the Journal of Risk Assessment (Newman and Strojan, 1998). While mainly utilized by medical practioners, it slowly spread to other disciplines. In the early 1980s, a group was assembled by The American National Academy of Sciences to quantify the risk assessment process. The risk assessment process was then broken up into multiple components. It was at this time that the importance of hazard identification increased significantly. Risk as defined by the United Nations Commission for Human Settlement (UNCHS) "implies future potential condition, a function of the magnitude of the natural hazard and of the vulnerability of all the exposed elements in a determined moment". Today, risk goes hand in hand with hazards. UNCHS has defined hazard as "the probability that in a given period in a given area, an extreme potentially damaging natural phenomena occurs..., which affects a given zone". However, disasters are the results of the interaction of both risk and hazards. Risk is directly related to the concept of disaster. It encompasses all the consequences suffered following a disaster, including deaths, injuries, damage to property and the interruption of activities (Maskrey, 1989). However, there is no risk if there are hazards but no vulnerable population, or if there is a vulnerable population but no hazard. Most places selected by humans as being attractive for occupancy and activity are found in areas that are subject to one hazard or another. For example, many cities and villages have been developed along the banks of rivers and in coastal areas that are susceptible to flooding. In other areas, people have taken up residence in homes and communities along fault lines in earthquake prone areas (Blaikie et al, 1994).

2.5 Vulnerability Assessment

Risk is one aspect of disaster literature in need of discussion, the other is vulnerability. Risk encompasses the likelihood that a certain level of loss will result from a known magnitude of hazard (Alexander, 1993). It is often challenging to differentiate between the two concepts because they are intrinsically intertwined. While vulnerability assessment includes risk and hazard information, it also describes the population at risk, essential engineering structures such as bridges and power lines that may be affected, and loss of critical infrastructure. Differential impacts and susceptibility are both elements of vulnerability assessments. The biggest difference between risk and vulnerability assessments is that vulnerability assessments incorporate social factors with the risk factors. This step is necessary in order to determine what makes some places or people more susceptible to damage from hazards than others. This is one of the factors that make it very difficult to truly assess because much more data is required, much of which may not be readily available. These factors are also very complex and their interactions may vary significantly from person to person or community to community (Cutter, 2001).

Vulnerability can be defined as the amount of resistance an individual or community has to the impact of a hazardous event. Their resistance depends on their resilience, which is their ability to handle and recover from a hazardous event, and their reliability, which illustrates the capacity to protect themselves with mechanisms against a hazardous event (Smith, 2004). Members of a community who have access to or own capital, land or equipment are typically the most resilient to a hazardous event. They are also the most educated with social networks which extend past their home or community. Whereas, those who are relatively underprivileged with little access to capital are those

who are the least educated and are often impaired by a social factor such as age, sex, ethnicity or health status (Blaikie et al, 1994). Other underlying factors that affect vulnerability are urbanization, changes in economic status, demographic shifts, cultural practices and the labour market (Cutter, 2001). It is also important to note that these factors are continually changing, making the assessment of vulnerability additionally difficult and especially dynamic (Mileti, 1999). Lack of organizational structure including governing bodies, effective decision making and communication are also detrimental when faced with a hazardous event (Smith, 2004). Therefore, the severity of impact can not only be determined by the magnitude of the event, but also implicates vulnerability.

The science of vulnerability assessments at the local level has not yet been adequately developed. Although there are several methodologies available for determining human vulnerability, there is no general consensus on which to use. Therefore, it is very difficult to assess vulnerability in practical terms (Cutter, 2001).

However, it is important to examine the vulnerabilities of a community in order to avoid two adverse consequences in the disaster continuum process. First, vulnerability assessment questions attempts to return a community to pre-disaster conditions, when often it is these conditions that initially contribute to a hazard becoming a disaster. The pre-disaster conditions, if not changed or altered may lead to future disaster events. Second, when prior knowledge of the existing vulnerabilities is established, the chances of increasing these vulnerabilities is decreased. Analyzing the capacities of a community is also important because capacities are areas of strength that may be built on to improve conditions (Anderson and Woodrow, 1989). It is for these reasons that disaster

mitigation and preparedness becomes so critical. Although, rather than being classified as anticipatory, most mitigation schemes tend to be reactive and this limits their effectiveness in scope and consistency (Office of Critical Infrastructure Protection and Emergency Preparedness, 2002a).

2.6 Mitigation

Mitigation can be defined as the reduction of the destruction caused by disasters and encompasses the decline of long-term risk to human lives, property and businesses. Mitigation activities include building codes, land-use management and tax incentives (Hy and Waugh, 1990).

A review of disaster literature has established that most mitigation schemes are applicable mainly to developing countries such as Bangladesh, Peru and Bolivia (Maskrey, 1989). Mitigation in developed countries such as Canada and the United States is still in its infancy. Since the 1970s, it has been recognized that mitigation schemes have not been the priority of government officials when planning for disaster. This is largely due to criticism that many mitigation programs have received. They have tended to be viewed as having a top down approach, orchestrated by the government or other agencies who have little knowledge of the internal dynamics of the community at hand, with very little input from the potential "victims" of the disaster. Many of these programs have helped only to reinforce the vulnerabilities of the community and lead to an increased sense of helplessness (Maskrey, 1989). It can also lead to the erosion of local knowledge and loss of traditional coping practices (Blaikie et al, 1994).

Local strategic plans and government mitigation initiatives tend to differ in their approaches and occasionally conflict with one another. Government plans are usually structural solutions requiring significant economic backing, while local-level solutions rely upon locally available resources. The mitigation schemes that have been directed at hazards affecting those in developing countries have had minimal success. Bangladesh is a good example of the challenges facing mitigation. Prior to 1988, most mitigation strategies encompassed large-scale capital-intensive structural flood prevention projects such as dykes, embankments and dams. Following the catastrophic flood in 1988 (Rogge, 1992), international aid agencies rushed into help economically, reinforcing the original structural engineering plans. These plans were not financially feasible in the long run and they also neglected the potential existing non-structural alternatives such as flood plain zoning and education. This type of zoning may aid communities live and cope with flooding more effectively. Research has shown that the best way to realize the full potential of a mitigation scheme is to incorporate them into popular public culture that accepts government structures, traditions, legislation and training methods. Success in developing countries has been accomplished by incorporating long-term development plans with systematic disaster mitigation (Blaikie et al., 1994).

2.7 Mitigation in the United States

In the past 30 years, there has been an increased interest in mitigation in developed countries. In the United States "under the 1993 Hazard Mitigation and Relocation Assistance Act" FEMA (Federal Emergency Management Agency) now allocates 15 percent of disaster financial assistance in declared disaster areas, towards

future mitigation initiatives. They can also fund up to 75 percent of the costs of local programs. In the mid-1990s, James Lee Witt, US President Bill Clinton's FEMA director, made mitigation the primary objective of the agency. FEMA (Stlves and Waugh, 1996) has officially stated, "mitigation must become a recognized national priority. Although mitigation makes good sense, it often is not a priority for communities. Establishing mitigation as a primary foundation for emergency management will decrease demands for response to disasters. Buildings, homes, and infrastructure that are built better, withstand hazards better. This means less destruction, less loss of life, less personal and economic hardship. This also means a reduction in outlays for disaster assistance by federal, state and local governments for rebuilding communities and businesses." However, FEMA is not without criticism. FEMA offices tend to be compartmentalized and isolated. State and local organizations find it difficult to interact with the federal department. Also, government agencies are penalized for saving money at the end of the budget year, which promotes wasteful spending on schemes that are often not well planned (Abernathy and Weiner, in Stlves and Waugh, 1996).

2.8 Mitigation in Canada

In Canada, there have been three major legislative acts passed relating to mitigation of floodwaters. The first was the Canada Water Conservation Assistance Act in 1953. This act was passed to make available federally funded assistance for the erection of structural works to help conserve and control water. The act permitted 37.5 percent of the cost of the works to be covered by the federal government, as long as their

contribution did not exceed that of the provincial government (Office of Critical Infrastructure Protection and Emergency Preparedness, 2002b).

The second act was the Canada Water Act passed in 1970. It was passed to supercede the first and was designed to include not only structural works but also non-structural water management alternatives, including funding for research to devise comprehensive water management projects. It also provided for economic, social and environmental factors to be considered in the formulation of mitigation plans.

The third act, the Flood Damage Reduction Program was implemented in 1975 to aid in decreasing rising flood damage costs. The program had three objectives. The first was the refusal of permission to build in high-risk areas. Building permits were subject to approval by CMHC (Canadian Mortgage and Housing Corporation). However, municipal governments have the authority to override CMHC, claiming that a single standard is not acceptable due to the variations in potential flood damage in each municipality.

The second objective has not been imposed in Manitoba. It stated that no person or business would receive financial assistance if a structure was built that did not adhere to the flood-proofing codes after the legislation had passed. However, it is generally acknowledged that the provincial government would not administer such inflexible actions. The third objective was to encourage local municipalities to promote zoning based on risk. However, the decision has been left at the discretion of municipal officials and has caused zoning to be inconsistent throughout the Red River Basin (Canada Mortgage and Housing Corporation, 1991)

There has been very little success in Canada to bring mitigation to the forefront. Unfortunately, the development of disaster and mitigation schemes tends to fall between the cracks of the conceptual framework that promotes response and recovery. They lack the appeal of preventing structural damage, decreasing injury, death or rebuilding a community but mitigation and preparedness schemes are equally important (Christoplos, 2001). However, they must not be based on the assumption that human response to hazards is rational: that is, if something is dangerous, the population will stay away from it (Simpson-Housley, 1987). This assumption has proven to be invalid not because humans are irrational, but because there are numerous factors that influence a person's decision live to in a certain area. Most importantly, their socio-economic position dictates where they will live, and other key characteristics include age, class, gender, family or job opportunities (Blaikie et al., 1994). While mitigation and preparedness are equally important, mitigation tends to be put on the back burner. However, in Manitoba, there has been some preparedness measures taken as each municipality is responsible for the development of a response plan.

2.9 Preparedness

Preparedness should include the development of operational plans for responding to a disaster or emergency. Preparedness activities include emergency operation plans, mutual aid agreements and warning systems (Hy and Waugh, 1990). In 1997, Quarantelli stated that to provide good preparedness planning at the local community level, the following 10-point strategy should be followed.

1. Disasters should be seen as quantitatively and qualitatively different from accidents and other emergencies.

2. The planning process should be continual rather than the production of an end product such as a written plan.
3. Focus should be placed on a multi-hazard study as opposed to a single-hazard.
4. It is important to coordinate local resources rather than demanding command and control.
5. General principles are more significant than specific details.
6. Assumes that during a disaster event, local people will respond in a good way.
7. Throughout the preparedness planning process importance must be placed on the integration of intra- and inter-organizational cooperation.
8. Each potential problem should have possible solutions or options.
9. Planning should be based on the systematic data recorded by scientists.
10. Mitigation, preparedness, response and recovery must all be included in the planning process.

2.10 Preparedness in Manitoba

In Manitoba, MEMO has set forth the following guidelines for every municipality in the Province of Manitoba. Each municipality is responsible for creating and personalizing a response plan in the event of an emergency. Once municipal plans are complete, they must be submitted to MEMO for further consideration and advisement. Plans must include sections on emergency preparedness, response and recovery. Each section is essential in the preservation of human lives, property and the environment within the municipality. Local authorities must begin by conducting a hazard and risk analysis that helps to identify all potential hazards as well as the resources that may be available to respond to an emergency event. Their plans should include the following:

- Contact numbers for emergency responders

- Identification of accommodations for people that may need to be evacuated
- Registration and inquiry capability
- Transportation routes in the event of an evacuation
- A media strategy to ensure the general public is informed of activities relating to the emergency event
- Technical communication capabilities
- Plans for persons with special needs, the elderly or others at risk that may be required to be evacuated on a priority basis
- Guidelines for the emergency responders to apply in specific situations such as evacuation due to potential dyke breaches.
- A hosting plan for evacuees
- A reentry/ recovery plan

(Manitoba Emergency Measures Organization, 2006a)

MEMO also promotes Mutual Aid Agreements between municipalities. A Mutual Aid Agreement can be defined as a partnership with surrounding municipalities that have the ability to aid in responding and hosting in the event of an emergency situation. The municipalities are also encouraged to develop strategies with local businesses, the Regional Health Authority and volunteer groups such as the Red Cross to make sure that limited resources are used to their full potential and also to eradicate any overlap, doubling-up or confusion. Mutual Aid Agreements also play a vital role in the event that the municipality's ability to deal with an emergency are likely to surpass their own capabilities. If the emergency surpasses the capabilities of those involved in the Mutual Aid Agreement then MEMO should be contacted to request the aid of the

provincial government. Resources can then be synchronized and deployed to the municipality in need. However, the local authorities in the municipality experiencing the emergency shall remain in control of the emergency response unless they request aid from MEMO, or if they have been rendered incapable of activating or assuming a management role. At this time, MEMO can also request the aid of federal resources if they are required.

Preparedness ensures that a community is equipped to forecast, plan for, take protective measures and respond to potential disasters (Christoplos et al, 2001).

2.11 Response in Manitoba

Response is comprised of all activities that are taken directly before, during and after a disaster situation. These activities are utilized to save lives, reduce property damage, and aid in the recovery process. Response activities include the activation of emergency plans, instruction to the public, search and rescue, and related tasks (Hy and Waugh, 1990).

In Manitoba, the response system is comprised of a tiered system, where each tier has a responsibility. Response begins with those closest to the emergency, which in most cases is the local authority, i.e. represented by the reeve/mayor. An emergency can be defined as a present or imminent situation or condition that requires prompt action and has the potential to result in a disaster. When the capabilities of the local authority are surpassed, responsibility then moves to the next appropriate level, which is the provincial government, specifically MEMO. The final level of the tiered system is the federal government, namely the Office of Critical Infrastructure Protection Emergency

Preparedness (OCIPEP). However, when responsibility shifts from one level to the next, the overall power of the local authority is not removed.

The Manitoba Emergency Measures Act (2004) puts the onus on all local governments to take prepatory measures in the event that an emergency or disaster should arise. The Act also includes a provision for the local authority to declare a state of local emergency. A state of local emergency can be declared by the reeve/mayor, if s/he is unavailable, then the local council assumes the authority of the reeve/mayor. Once the decision to declare a local state of emergency has been made, the residents of the municipality and the Minister responsible for the Emergency Measures Act must be notified. The declaration must include a description of the situation, identify areas that are affected and state the date and time the declaration is effective. Typically, a state of local emergency lasts 14 days but can be extended an additional 14 days if approved by the Minister. The declaration should affirm that all laws, regulations and orders must be followed.

A declaration of a state of local emergency is made because emergency powers are required to aid in effectively responding to a disaster event. Special emergency powers include:

- The use of personal property
- Requiring municipal residents to aid in response efforts
- The ability to control, permit or prohibit travel in an area
- Allows for the evacuation of persons, livestock and personal property
- Restricts the movement of people in affected areas
- Allows for entry into building, homes and upon land without authorization

- Permits the removal of trees, structures or crops
- Authorizes the distribution of resources and essential services
- The expenditure of municipal funds

It is important to note that it is not necessary to declare a state of local emergency in order to be eligible for Disaster Financial Assistance (Manitoba Emergency Measures Organization, 2006a).

2.12 Recovery in Manitoba

Recovery should include actions taken to repair, rebuild and recover from a disaster event, restoring a community's standard of living to one that is comparable to their pre-disaster level. Recovery activities include disaster financial assistance, rebuilding structures and repairing infrastructure (Hy and Waugh, 1990).

In the Province of Manitoba, there is the availability of disaster financial assistance. The purpose of the disaster financial assistance policy is to provide financial aid the public and private sectors of a municipality when costs incurred from a disaster exceed the amount which any one local authority or individual may reasonably be expected to bear on their own.

2.13 The Public Sector

The purpose of Disaster Financial Assistance is to assist local authorities financially when the eligible costs incurred resulting from a disaster exceed the amount which any one local authority may reasonably be expected to bear on its own.

It also ensures that regulations, if any, and guidelines respecting Provincial Disaster Financial Assistance policy are, wherever possible, consistent with Federal Disaster Financial Assistance Guidelines in order to maintain continuity in the disposition of disaster assistance claims regardless of which government level provides the financial assistance.

Financial assistance will be provided on a "one-time" basis only for the reconstruction of private property in disaster prone areas, unless efficient action is taken by the claimant to avoid the reoccurrence of damage. All religious institutions, which meet the secular needs of the community, will be given assistance for their eligible costs, as will certain charitable clubs and camps. Eligible costs are defined as "those necessary to provide basic assistance to repair or assist with certain losses in order to place the affected persons or institutions back in a pre-disaster condition with respect to essential items only". Homes, which are determined to be irreparable and no flood proofing efforts have been made, and for which assistance if provided, are not eligible for assistance in the future. However, eligible costs in the public sector include:

- Damage to public works, such as, roads, bridges, dikes, dams and breakwaters;
- All pre-emptive actions;
- Costs incurred by the municipality for rescue, transportation, emergency health arrangements, emergency food, shelter and clothing;
- Removal of livestock;
- Subtraction of valuable chattels and hazardous materials;
- Evacuation of residents;
- Rental of equipment necessary for the construction of protective works;
- Emergency medical care;

- Transportation of hospital patients;
- Security measures necessary to ensure to safety of evacuated homes and for protective works;
- Communication facilities;
- Emergency Operation Center;
- Facility for registration and inquiry services;

(Manitoba Emergency Measures Organization, 2006b)

Ineligible costs for the public sector include:

- Crown corporations unless they provide sewer and water services
- Cost which are recoverable by insurance
- Costs which may be covered by other government programs
- Damage to property which assistance was previously made available to prevent such damage
- Costs which are thought to be normal operating expenses
- Intradepartmental trading of equipment
- Interest costs on bank loans for monies borrowed by a municipality
- The purchase of special or additional equipment
- Salaries of permanent employees

(Manitoba Emergency Measures Organization, 2006b)

All applications for assistance by the public sector must be received within 90 days of the official announcement of a provincial assistance program.

The cost-sharing formula outlined below, by implication defines the "unreasonable financial burden upon a local authority" and the sharing of that burden by the Province of Manitoba, as follows:

Table 1: Cost-Sharing Formula

Per Capita Eligible Cost	Provincial Share	Local Authority Share
$0.00 to $1.00	0%	100%
$1.01 to $3.00	50%	50%
$3.01 to $5.00	75%	25%
$5.01 plus	90%	10%

Source: Manitoba Emergency Measures Organization (2006b)

This provincial/local authority cost-sharing formula is adapted from the federal/provincial cost-sharing formula outlined below:

Table 2: Federal/Provincial Cost-Sharing Formula

Federal/Provincial Cost-Sharing Formula		
Provincial Per Capita Eligible Cost	**Federal Share**	**Provincial Share**
$0.00 to $1.00	0%	100%
$1.01 to $3.00	50%	50%
$3.01 to $5.00	75%	25%
$5.01 plus	90%	10%

Source: Manitoba Emergency Measures Organization (2006b)

The provincial policy and guidelines define eligible expenditures as those necessary to provide basic assistance to the private or public sectors to repair damage or assistance for certain losses in order to place the affected persons or institutions back in a pre-disaster condition with respect to essential items only.

All damage to public works such as roads, bridges, dikes, dams, breakwaters, etc., shall be eligible for assistance only in an amount which would restore the public work in question to its immediate pre-disaster condition. No assistance shall take place in respect of upgrading public works to higher standards than those which existed before the disaster.

Chapter Three: Conceptual Framework

3.1 Introduction

Emergencies can strike with devastating effects. Preparedness is key in minimizing potential damage to human lives, property and infrastructure. This section discusses the integrated approached modeled by Tobin and Montz (1997) to illustrate all of the components that are required to determine planning objectives. Their model is comprised of the physical characteristics of a hazard, the political and economic factors that play a role, and the social characteristics of the environment in which the hazard is present, which can be applied to overland flooding in this case study. These three hazard dimensions all aid in defining the risk to a community thus helping to define their vulnerability. Every municipality has strengths and weaknesses, which further accentuate the vulnerabilities and capacities of the RM; therefore the Vulnerabilities and Capacities Analysis Matrix by Anderson and Woodrow (1989) is also discussed. Tobin and Montz's model provides the foundation for understanding the steps necessary to formulate planning objectives and also underlines how the relationship between the lack of comprehensive planning contributes to the severity of damage caused by overland flooding.

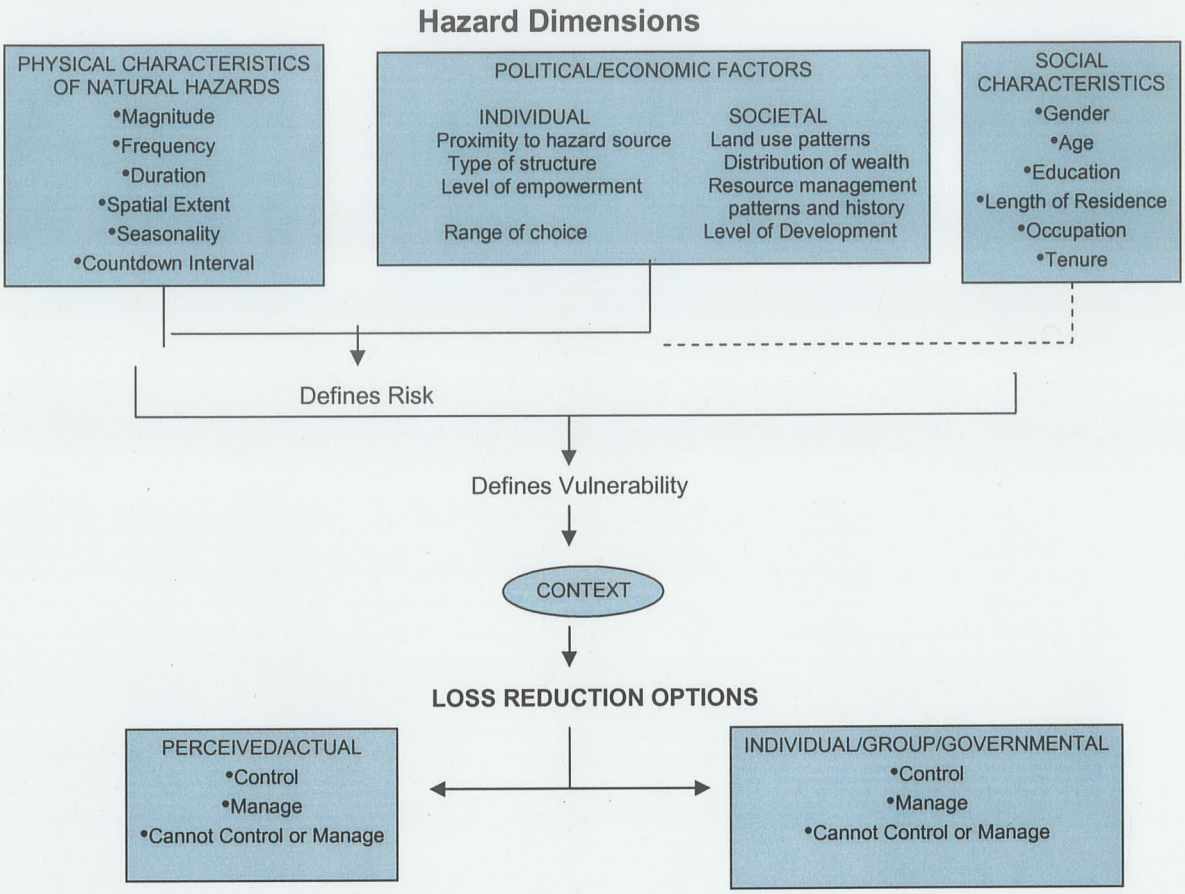
3.2 The Tobin and Montz Integrated Approach Model

Tobin and Montz (1997) have taken an integrated approach to modeling natural hazards (See Figure 4). They have incorporated elements from both social and natural science, and have done so to provide a comprehensive view of how different societies respond to extreme geophysical events. Their model stems from a variety of disciplines,

reflecting the true interdisciplinary nature of natural hazard research. It is their contention that experiences with individual types of hazards and events provide tools and lessons which can be applied to future events. It is the integration of past experiences coupled with political and economic factors and societal elements from which a framework for analysis has been developed, as well as an understanding of potential mitigating factors.

Tobin and Montz (1997) are conscious of the critical link between theory and application yet also appreciate that there is no cure all model for natural hazards mitigation. However, by increasing our understanding of the human and physical elements that contribute to the severity of an event, the potential to decrease losses increases. They stress the importance that hazards not be viewed in isolation. Hazards and the events which follow still need to be considered as real-world events, which overlap other societal problems. This makes them very difficult to define because they interact with all aspects of society exacerbating the vulnerabilities of a community. Hazards are also complicated by issues of scale. Response is driven by the social behavior of a community (Burton et al., 1993). When combining the social aspects of a community with political and economic realities, mitigation is further complicated.

Figure 4: Tobin and Montz's Integrated Approach Model



Source: Adapted from Tobin and Montz (1997)

3.3 Physical Characteristics of Natural Hazards: Overland Flooding

It is important to explore the probabilities that a hazard may pose a threat to human interests in a specific geographic area. The history of previous flood emergencies in the municipality must be explored. Information can be gathered by examining local historical records, newspapers and journal articles. Local government records and officials are an excellent source of information. Other potential sources of recorded data include government agencies such as Manitoba Conservation, Manitoba Emergency Measures Organization, Manitoba Highways, the RCMP, Manitoba Health, Social Services and Manitoba Agriculture. Additional information may also be drawn from bordering Municipalities who may share the hazard risk.

Basing a response model purely on physical factors has little chance of success because there are many other variables that influence a community's decision-making process (Alexander, 1993). However, the physical attributes should not be overlooked. The physical characteristics below, when intensified require action and can put the economic and political wheels in motion to accelerate the response

A) Magnitude - depicts the potential damage to human lives, homes, businesses, social services, agriculture and local infrastructure.

B) Frequency –how often each type of event occurs.

C) Duration –describes the length of the event.

D) Spatial Extent–details the geographic area which may be affected.

E) Seasonality– the time of year when the potential hazard is present.

G) Countdown Interval – details the amount of time that is available before the known onset of an event (Tobin and Montz, 1997).

3.4 Political – Economic Dimensions

Every hazard prone area is affected to some extent by political and economic constraints. However, it is not just the availability of money for mitigation schemes that is an issue but often it is the distribution of the available resources. Mitigation schemes from a political and economic standpoint are often difficult to justify because of the potential infrequency of the events.

The distribution of available resources requires planning and the commitment of not only financial capital but also the assurance of human and natural resources. Tobin and Montz (1997) state that political and economic factors all interact to fabricate constructs that determine how a community will function. These constructs are what determine the vulnerability of a community. These political/economic constraints are the elements that can propagate risk and increase vulnerability.

Not all members of a community are equally at risk or equally vulnerable; some are more vulnerable than others depending on their economic status. The common sense approach is to "get out of harm's way"; however, most members of a community are unable to do so from an economic perspective. It is not feasible to expect an individual to abandon his/her home and livelihood in times of disaster (Blaikie et al., 1994).

3.5 Social Characteristics

There are many social characteristics present in a community that are in place prior to a hazard event that contribute to its severity and impede effective disaster response and recovery. Every community has defining social characteristics and identifying them prior to the event enables planning focus to work within the confines of

those characteristics rather than imposing changes that will fail (Anderson and Woodrow, 1994).

Important social characteristics of a community as stated by Tobin and Montz (1997) that must be examined include:

a) Gender;

b) Age;

c) Education;

d) Length of Residence;

e) Occupation;

f) Tenure.

Many places selected by humans as being attractive for occupancy and activity are found in areas subject to hazards. Mitigation schemes must not be based on the assumption that human response to hazards is rational; that is, if something is dangerous, the population will stay away from it. This assumption has proven to be invalid, not because members of a community are irrational but because there are numerous social characteristics which influence a person's decision to live in a certain area (Alexander, 1993). There are also social behaviors which influence the disaster continuum. It is for these reasons that it can be argued that the perception of the hazard is cause for concern. Perception and response to hazards are intricate processes involving many of the above mentioned social characteristics (Mileti, 1999). For many community members, the ability to move to a safer, less hazard prone area is simply not feasible.

According to Mileti (1999) "people are typically unaware of all the risks and choices they face. They plan only for the immediate future, overestimate their ability to cope when disaster strikes, and rely heavily on emergency relief."

3.6 Accepted and Acceptable Risk

The perception of risk also plays a role in the selection of place to live. Tobin and Montz (1997) describe what they call accepted and acceptable risk. While some may accept the risk of living in a particularly hazardous place, it does not mean that the community views the risks of living there as acceptable. As above mentioned there are numerous reasons why people choose to live where they do. Most often their choice of location to reside is made based on a person's socio-economic position. Changing locations is not always financial feasible. So even if their choices are limited, and their perceived risks and benefits are not widely recognizable, it may be argued that the risk is still accepted.

Acceptable risk on the other hand is typically decided on by the decision-makers of a community. The benefits are weighed against the financial cost of alleviating some of the risk. Therefore, acceptable risk is founded on the overall benefit or perception of benefit for a community. Acceptable risk is typically a politically driven decision.

3.7 Perceived Risk

Perception is reality to most people and the factors that determine their perceptions of a risk are varied and complex. Yet it is crucial to understand the perceived risks in a community in order to comprehend and anticipate their response to the risk and

reduce possible negative outcomes. Perceived risk is very difficult to measure due to the numerous social, psychological and environmental factors which affect perception (Mileti, 1999).

Perhaps one of the largest factors influencing perceived risk is the availability of information. Information is widely available through numerous media outlets. The media tends to over sensationalize catastrophic events, bombarding the general public with information that is not proportionately related to statistical frequency or magnitude of a hazard. Communication between the media and the general public is very imprecise. Radio, television and the internet are the principle source of information for most people and the councilors in the municipality unfortunately, are no exception. Therefore perceived risk is often inaccurate from real risk.

3.8 Municipal Vulnerabilities

It is important that the vulnerabilities of a municipality in a hazard area be identified. Vulnerabilities can be defined as the characteristics of a group of people in a municipality in terms of their capacity to anticipate, cope with, resist, and recover from the impact of an emergency event (Blaikie et al, 1994). Vulnerabilities precede disasters, contribute to their severity, and impede effective disaster response and recovery. Every municipality has vulnerabilities and by identifying them prior to a disaster enables changes to be made to reduce the possible effects of these vulnerabilities during and after and emergency event (Alexander, 1993).

3.9 The Capacities and Vulnerabilities Analysis Matrix

To avoid the risk of increasing vulnerabilities, it is also necessary to identify the capacities of a municipality. This is important because it recognizes the areas in which a municipality has strengths. Examining the capacities of a community can also aid in the design and implementation of emergency plans (Anderson and Woodrow, 1989). Vulnerabilities can best be understood when divided into the following three groups, specifically physical/material vulnerability, social/organizational vulnerability, and motivational/attitudinal vulnerability.

3.9.1 Physical/Material Vulnerability

The most visible area of vulnerability is the physical/material. Most commonly it is the less affluent that suffer the most from physical/material impoverishment. Vulnerability is closely linked with socio-economic position. The less affluent may be more likely to suffer physical deprivation but everyone is vulnerable to a disaster, however, each is affected differently. Physical/material capacities are also important and may include land, their health, skills, labor and physical technologies (Anderson and Woodrow, 1989).

3.9.2 Social/Organizational Vulnerability

Perhaps less obvious but equally important are the social/organizational vulnerabilities of a municipality. Social/organizational vulnerabilities can lead to the victimization of a municipality. The social/organizational realm is comprised of how a municipality is organized, run and how it manages internal conflicts. This category also

includes the formal political, social and economic structures of a community as well as the informal systems through which a municipality makes decisions, establishes leadership, and organizes activities (Anderson and Woodrow, 1989). Each of these vulnerabilities might also be viewed as capacities.

3.9.3 Motivational/Attitudinal Vulnerability

Motivational/Attitudinal vulnerabilities are also important when assessing a municipalities overall vulnerability to a disaster. The motivational/attitudinal realm encompasses how people in a municipality view themselves and their ability to affect their environment. A municipality can be motivationally vulnerable when people feel victimized, fatalistic, or dependent. Religion can also provide common faith and strength among people in a municipality (Anderson and Woodrow, 1989). Some people simply consider disasters as inevitable events, and may perceive them as acts of God and beyond human control (Asgary and Willis, 1997).

It is important to note that vulnerabilities in the motivational/attitudinal realm vary with context and culture. However, when people share a common sense of purpose, empowerment, or awareness that they are in charge of their own lives, the easier it is to build better and stronger municipal capacity to withstand disaster.

It is essential to explore the vulnerabilities of a community in order to understand why a disaster has occurred, what type of impact has resulted, why it affected a particular group of people, and how to estimate future risks. However, in order to avoid exacerbating vulnerabilities, it is imperative to identify the capacities of a community. In other words, to identify areas in which a community demonstrates strength and resilience.

Once both areas have been recognized, it is possible to build on these strengths and manage vulnerabilities (Blaikie et al., 1994).

3.10 Disaster-Damage-Repair-Disaster Cycle

The most common response to hazards has been a continuing cycle of disaster – damage – repair – disaster. The cycle does not promote a reduction in vulnerability. Most repairs that are undertaken following a disaster event tend to increase future problems by only alleviating the symptoms of the hazard rather than adjusting the root cause of the problem. Financial aid is much needed relief to most recipients, however, it often contributes to future hazard predicaments and returns a situation or circumstance to pre-disaster conditions. Homes are repaired, roads and bridges are rebuilt, schools are re-opened and business resumes. Unfortunately, most adjustments that are made do not eliminate future risk even if it may reduce it. The cycle of Disaster-Damage-Repair-Disaster is continually repeated. It is this cycle that needs to be broken in order to sustain future preparedness but the post disaster or response and recovery phase do not promote change to alleviating risk and changing the physical or social vulnerabilities (Tierney et al., 2001).

Efforts that are made to increase capacities must be sensitive to the needs of those that require the aid. Relocation projects such as moving a home or business will not be well received or welcomed if sufficient funding is not available. On the other hand, many are in no hurry to relocate if financial aid is always readily available. It is for this reason that the root causes of a hazard must be addressed not just the symptoms (Blaikie et al., 1994).

Disasters will continue to occur regardless of the mitigation schemes that are put into place. It is impossible to control all aspects of a changing environment or society but that is not to say that losses cannot be significantly reduced. By recognizing that responsibility for disasters resides not only in the physical aspects of a hazard but also in the social, political, economic realms, is the key to break the cycle.

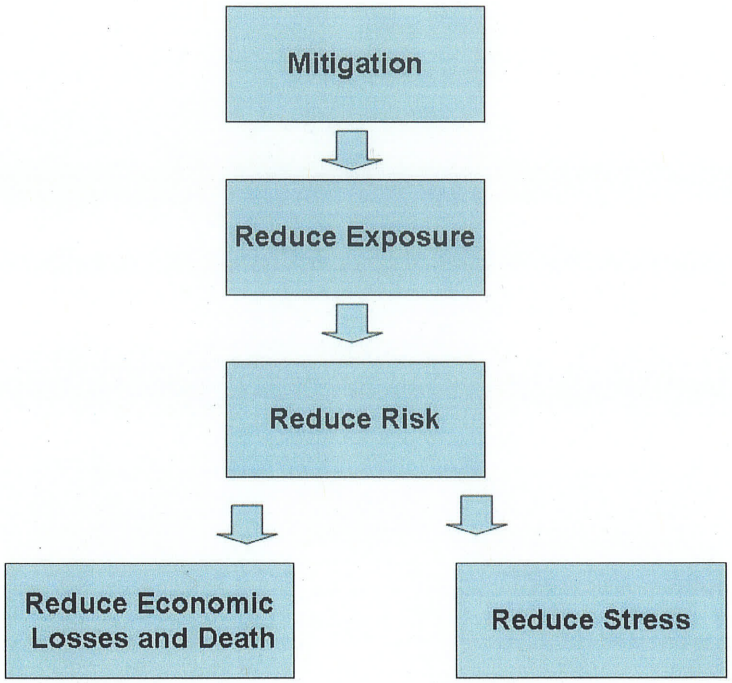
The alteration of risk and vulnerability are the ultimate result of the Tobin and Montz model. Their model emphasizes the physical characteristics and political factors that define risk. The social characteristics are also important but only as they relate to the other boxes; hence the dashed line (See Figure 4). Vulnerability on the other hand is the result of all of the factors in an assortment of combinations. Tobin and Montz (1997) propose that if you change one of these factors in turn either the vulnerability or risk will be altered. They are also aware that it is difficult to measure the extent to which it has been altered, but that it is important nonetheless when developing emergency plans. It is in this manner that they define context. Risk and vulnerability are part of context. Altering a factor in any of the categories often affects the others. Because hazards are often not seen as a community priority yet can inflict huge financial burdens on a community it is vital to understand the conceptualization of their model as a whole but also in its varied context. Loss reduction is the goal of the model through hazard mitigation. Tobin and Montz (1997) stress the importance of understanding all of the players and the roles that they play.

3.11 Hazard Mitigation – Two Perspectives

Disaster events can bring out both the best and worst in people. It never ceases to amaze the courageous things people will do when facing a hazard situation. They will lend a helping hand to friends and neighbors in their time of need. Sandbagging for hours on end, cook meals for those working to protect the community and offer child care services. Communities can be brought together to face their hazard event jointly or a community's image can be tarnished by those who take advantage of those hardest hit by looting and hoarding.

However, it is not the individual's actions that are the most appropriate for mitigation loss. It should be the role of the local government. Figure 5 shows the traditional role of the local government.

Figure 5: The Traditional Approach



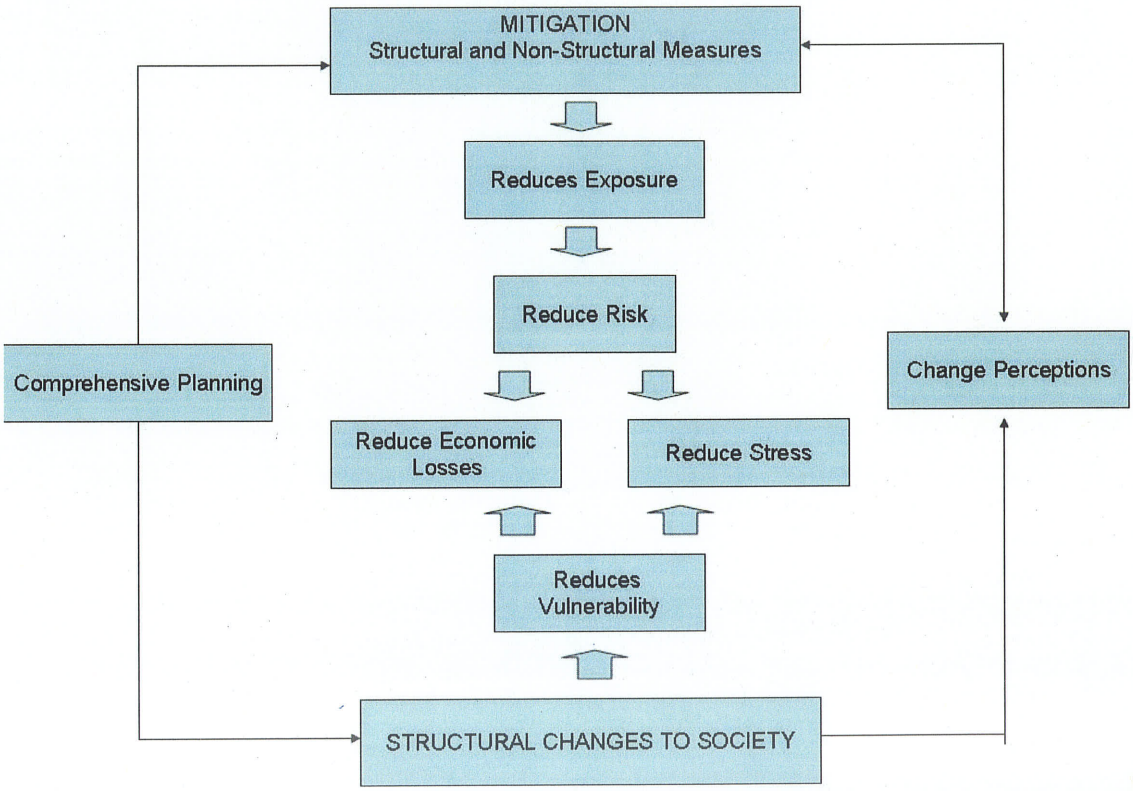
Source: Tobin and Montz (1997)

3.11.1 The Traditional Approach

This traditional approach has been less than successful for numerous reasons including the changing nature of society, lack of experience, and lack of education in disaster management (Alexander, 1993). Traditionally structural measures have been taken to prevent or alleviate the effects of a hazard. For example, building levees or spillways to mitigate river flooding. More recently, however, there has been a shift from structural measures to non-structural measures such as insurance programs and land use regulations. It is for this reason that Figure 5 must be changed to accommodate a more

wide-ranging view of hazard mitigation as shown in Figure 6 as recommended by Tobin and Montz (1997). Post disaster recovery must not be allowed to simply band-aid the pre-disaster problems. Changes must be made at all levels of government and to all parts of a community (Tobin and Montz, 1997). The local government needs to focus on the needs of those in hazard prone areas and community members need to be made fully aware of the hazardous nature of their location.

Figure 6: Tobin and Montz Revised Approach



Source: Tobin and Montz (1997)

3.11.2 Guiding Principles for Managing a Reduction in Vulnerability to Natural Hazards

Blaikie et al. (1994) have established twelve principles to guide mitigation and reduce vulnerabilities. They believe that it is the human response that is in the most need of adjustment. Table 3 demonstrates the vision of Blaikie et al.

Table 3: Guiding Principles for Managing a Reduction in Vulnerability to Natural Hazards

1. Vigorously manage mitigation.
2. Integrate elements of mitigation into development planning.
3. Capitalize on a disaster to initiate or develop mitigation.
4. Monitor and modify to suit new conditions.
5. Focus attention on protection of the most vulnerable.
6. Focus on the protection of lives and livelihoods of the vulnerable.
7. Focus on active rather than passive approaches.
8. Focus on protecting priority sectors.
9. Emphasize measures that are sustainable over time.
10. Assimilate mitigation into normal practices.
11. Incorporate mitigation into specific development projects.
12. Maintain political commitment.

Source: Adapted from Blaikie, Cannon, Davis and Wisner (1994).

Tobin and Montz have combined their revised model of hazard management (Figure 6) with Blaikie et al. (1994) principles from Table 3 to decrease vulnerability and

incorporate wide-ranging planning that includes all of those involved to avoid repeating pre-disaster mistakes.

Chapter Four: Data, Analysis and Results

4.1 Introduction

Overland flooding can occur in as little as twenty-four hours, with devastating consequences. There is often very little time to prepare for the onset of the water inundation. The events of June 2002 have proven that the RM of DeSalaberry is vulnerable to such an event. The municipality lacks the necessary infrastructure, economic resources, equipment, and trained and organized personnel making it poorly prepared to cope with the potential risks from an overland flooding event. It is for this reason that improved mitigation and preparedness schemes are critical. Examining the characteristics of overland flooding, its potential effects, along with the vulnerabilities and capacities of the municipality, and combining their previous experience with this type of event and the examining its potential consequences, will aid in determining planning objectives. In turn, planning objectives will help to minimize the overall effects of overland flooding and may help to prevent flooding from occurring in the future.

4.2 Physical Characteristics of the Overland Flooding Hazard

Overland flooding is the most common, significant and problematic geophysical hazard in the RM of De Salaberry. On June 9th, 2003 a series of localized storms producing high intensity rainfall began to inundate the municipality. The small drainage basins of the Rat River and Joubert Creek could not handle the intensity of the convectional cells and overland flooding ensued. Over a two day period, 2300 CFS was measured at the station located at Joubert Creek in St. Pierre-Jolys and 5015 CFS was measured on the Rat River near Otterburne (Manitoba Conservation Water Branch,

2002). This type of flooding occurs mainly in the late spring and summer months. The potential for damage is immense because these storms produce large volumes of water, which are rapidly concentrated in both time and space.

Normally, groundwater is the main supply of water to the Rat River and Joubert Creek. When an intense localized storm deposits a large amount of rainfall in an area, some of the water with infiltrate into the soil, while some will flow over the surface as runoff. The runoff reaches the river quickly, which causes the rapid rise in the level of the River. However, the amount of rainfall that accumulated in June of 2002 saturated the soil and was unable to be absorbed in the river causing the river to spill its banks. Table 4 demonstrates the analysis of the overland flooding hazard based on Tobin and Montz's model.

Table 4: Analysis of Overland Flooding Hazard

FACTOR	ANALYSIS
Magnitude	Severe – potential for injury, damage to buildings, property, homes and businesses, disruption of roads, utilities and communication
Frequency	Major overland flooding events requiring some form of Disaster Financial Assistance occur approximately every 4-5 years
Duration	Up to 1 month
Scope	Could affect up to three miles on either side of the Rat River
Seasonality	Typically occurring in the Spring or Summer
Countdown Interval	Six to twenty-four hours

Due partly to the lack of education and information on the overland flooding hazard and its potential risks, the local government has a poor understanding of the cumulative and specific risks of the physical hazard.

4.3 Political/Economic Factors

For the purposes of this thesis, the examination of a few key political/economic factors have been addressed. The first is the internal infrastructure that make-up the networks that govern the municipality. The local government in RM of De Salaberry is governed by one reeve and six counselors. All are elected officials and must run for

office every four years. The reeve oversees the entire municipality while the counselors are each responsible for their designated ward. The reeve has the authority to declare a state of emergency and has the final decision-making ability in all wards on issues presented to council.

The current reeve in the municipality has held his position since 1998. He currently resides in St. Malo and also holds the position of town butcher in the local grocery store. He has been a resident of the municipality for more than 30 years. However, he has no formal education or training in disaster or emergency preparedness, mitigation, response, or recovery. Neither do any of the other members of the council yet these are the people ultimately responsible for all aspects of the disaster continuum process in the municipality (Manitoba Emergency Measures Organization, 2006a). At the time of the June 2002 overland flooding event, the members of council were made-up of a grain farmer, a bobcat contractor, a homemaker, a teacher, a retired truck driver, and a retired farmer. Their length of tenure on the council varied between 4 and 22 years with education levels ranging from grade 7 to a university degree. Members of council also ranged in age from 42 to 65 years old. All members of the council had lived in the RM for a minimum of 20 years.

While all of the council members have personal experience with the overland flooding issues in the municipality, none of them have the expertise as to how to respond in an emergency. After participating in and reviewing minutes from a local council meeting, it is apparent that the issues that dominate the majority of their time are those revolving around the purchase of new sidewalk signs, the repair of municipal equipment, and the approval of property subdivision requests.

Short term thinking often prevails over hazard mitigation. Preparing for and mitigating hazards often takes a backseat to other municipal priorities. Response and recovery issues get much more economic support and also have more political appeal than preparedness and mitigation, especially when preparing for an event that may or may not happen during the local government's time in office.

Secondly, the local government in the RM of De Salaberry, like most small municipalities, relies primarily on volunteers, and thereby lacks the required training to effectively respond to a disaster. Their reliance on volunteers as emergency personnel is of concern to the local council. The municipality has a small population base for a large region, and it is difficult to find a sufficient number of trained and experienced volunteers to prepare for and handle large emergencies. It is also difficult to assign a volunteer to a position of leadership with a high level of responsibility and that are willing to commit and devote time and energy to undertake training and ensure that their skills are upgraded on a regular basis. The RM not only has a small population, limiting human resources, but they also have a lack of economic resources. This makes it challenging to provide the training that would be required to maintain a level of preparedness adequate to effectively mitigate the hazard. There is also a shortage of emergency equipment and, due to financial constraints, it is often difficult to keep the equipment they do have maintained.

Volunteers are also typically responsible for flood preparation activities including sandbagging, building dykes, securing the use of available pumps and acquiring boats and motors prior to and during an overland flooding event.

The local government also recognizes that their initiatives cannot be realized without external assistance, particularly in the area of human resources and training.

While mutual aid agreements exist for fire protection with the bordering municipalities of Richot and Hanover, there are no formal mutual aid agreements in place for public works equipment in the event of an overland flooding event. However, many local farmers donate the use of their equipment. Again, it is through the efforts of volunteers that this equipment share is organized.

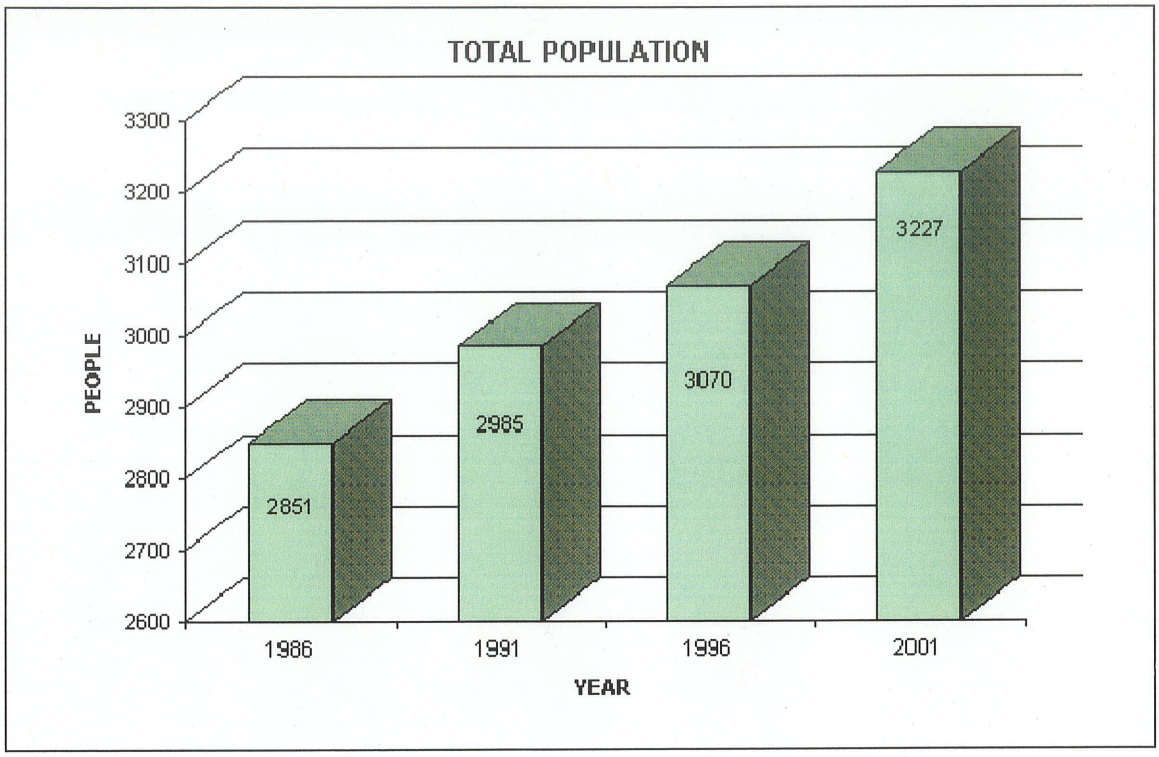
The local authorities are also influenced by the media when making decisions. They acknowledged that their primary source of information often came from media outlets. Unfortunately, the information that is being received from the media is sensationalized to sell newspapers or to capture the attention of the public leaving the viewer with an unclear idea of the true risks involved in a hazard. There are numerous problems with council receiving their information about the hazard from the media including the personal spin put on the story by the reporter or the quote that is from an individual who is emotionally involved in the event may have their perception skewed by personal experience. There is also the risk of bias or misrepresentation. Events are often overplayed or underestimated and are distorted from the reality of the event to appease the public for whom the story is intended (Alexander, 1993).

4.4 Social Characteristics

Knowledge of the municipality's social characteristics is important in terms of preparedness planning as it gives a measure of the human resources that are available in the event of an emergency as well as the community's capacity for dealing with such crises. Such knowledge can also be utilized to ascertain the preparedness needs of the community.

As of the 2001 Census, the total population of the municipality was 3227. The population has steadily increased by 4-8% over the past fifteen years.

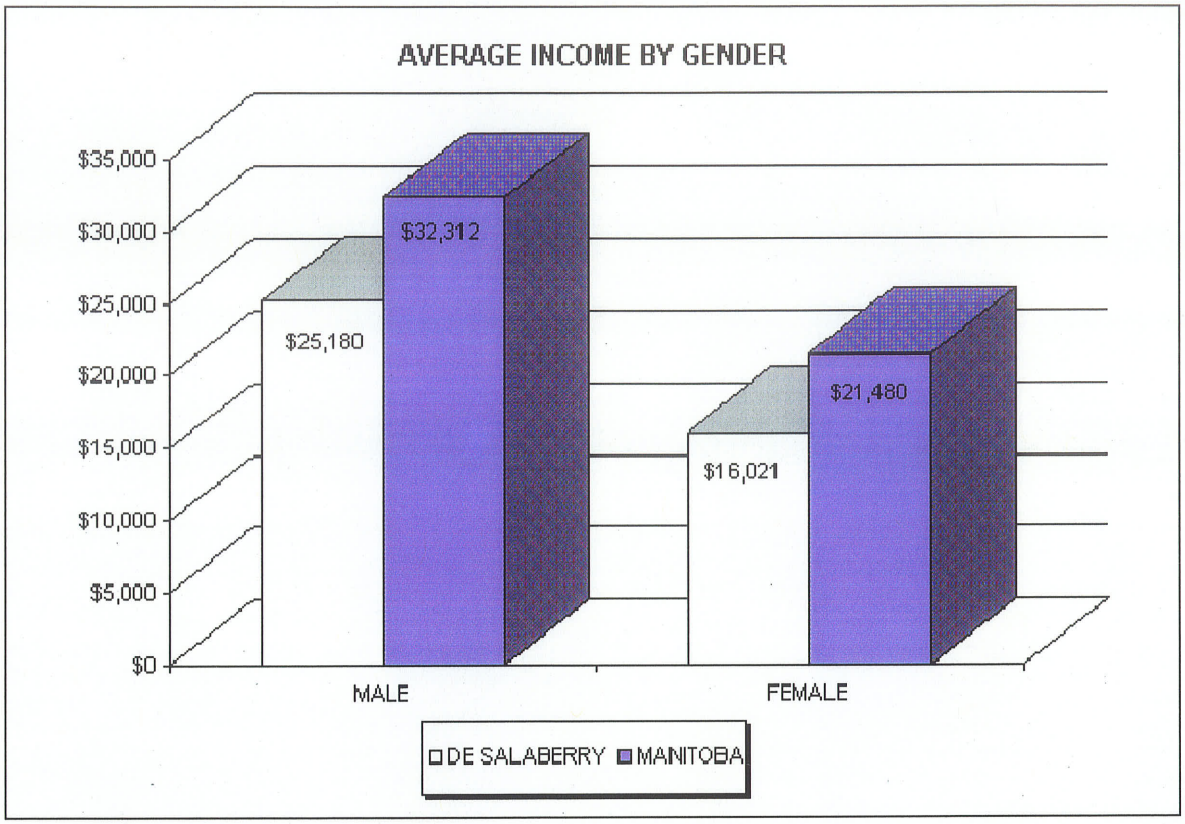
Figure 7: Total Population of the RM



Source: Census Canada, 2001

Just less than fifty percent of the population falls into the working age cohort (25-64).

Figure 8: Average Income by Gender



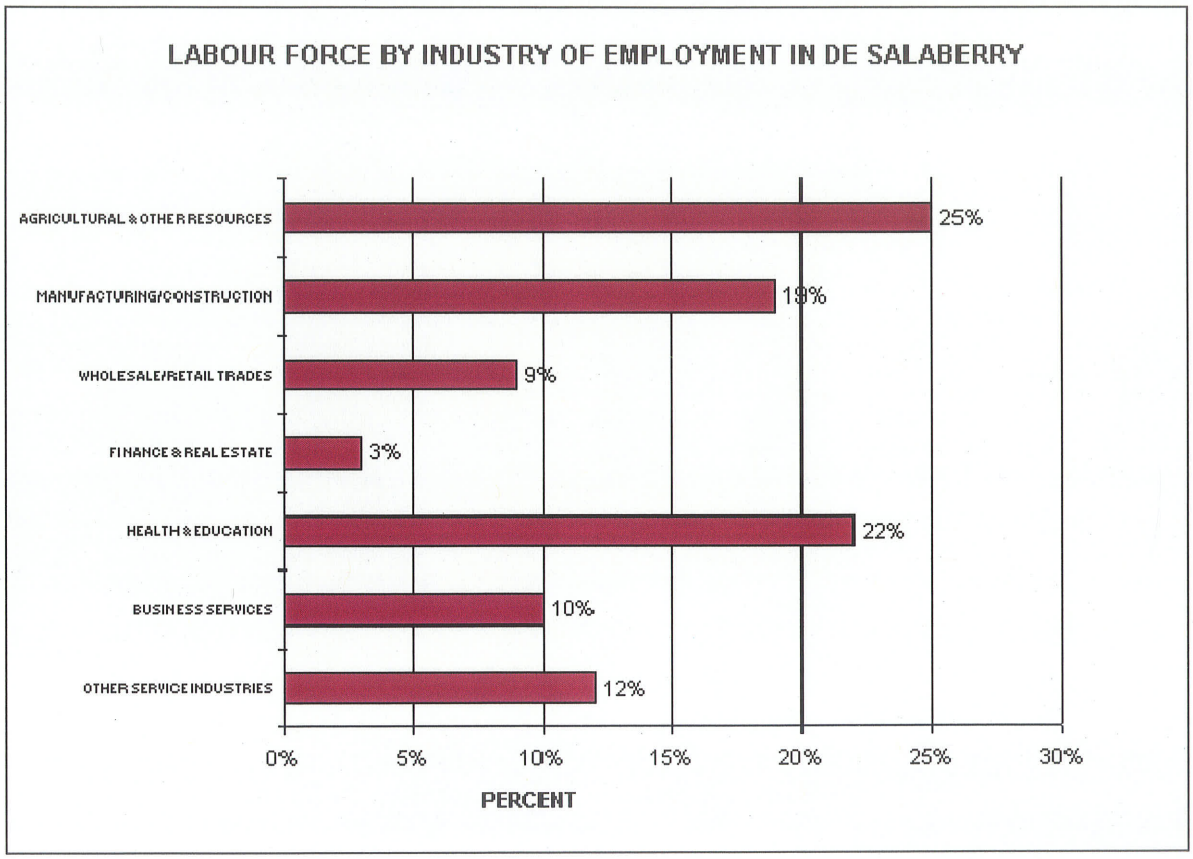
Source: Census Canada, 2001

Men in De Salaberry earn an average of $25,180 annually and women earn an average of $16,021. The lower earning potential is a reflection of limited economic base as discussed in chapter one. The average income earned by both men and women is the RM is lower than the provincial averages.

The number of people who participate in the labour force in the RM is also lower than the provincial averages, due largely to the lack of available employment opportunities. The agricultural, health and education and manual labour sectors employ more than sixty-six percent of the municipality's workforce. However, most of these

sectors are seasonal and unpredictable. An unfavorable summer season can make financial success a difficulty. The business and professional services available, as mentioned in chapter one, are limited. Therefore the opportunity for professional development is curbed.

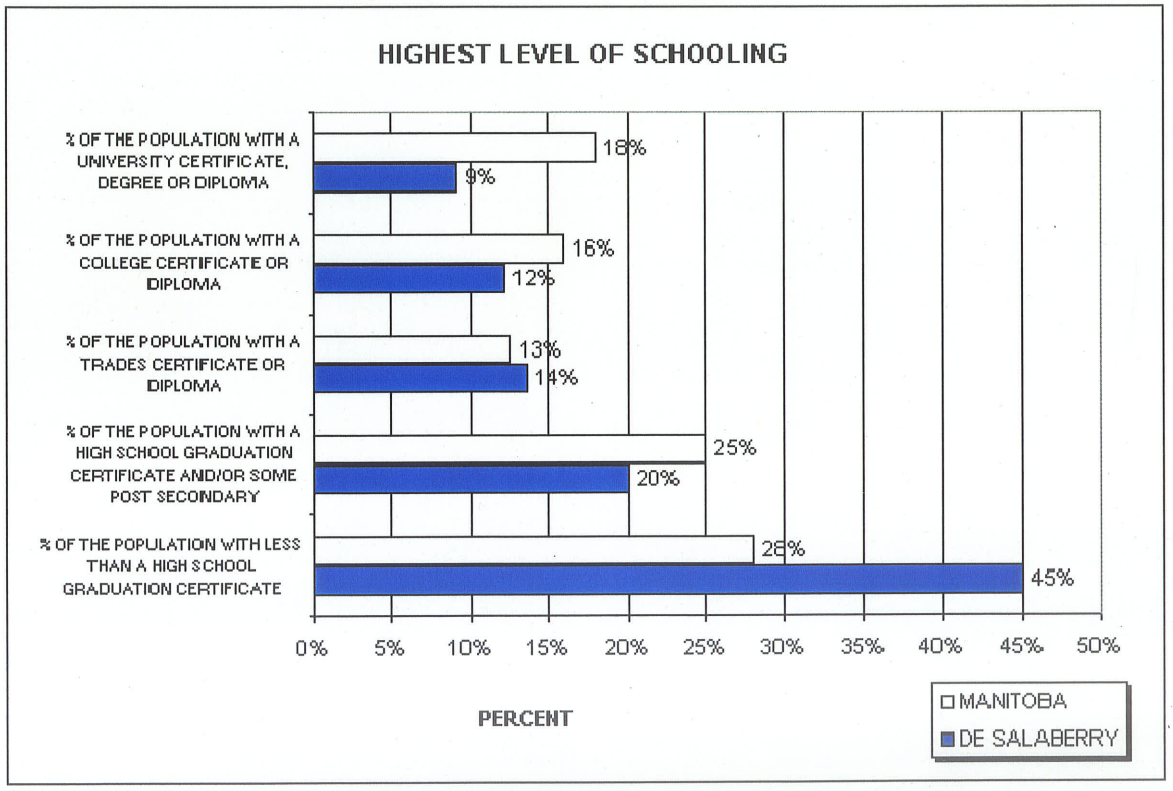
Figure 9: Labor Force by Industry of Employment



Source: Census Canada, 2001

Education levels in the RM fall below the provincial average in almost every category. In comparison to the provincial education averages, the RM of De Salaberry exceeds the provincial averages of the percentage of the population with less than a high school graduation certificate by seventeen percent. The only area in which the RM exceeds the provincial average is in the population with a trade certificate or diploma category and the RM only exceeds it by one percent. Again much of the trade work is seasonal and does not allow for economic stability.

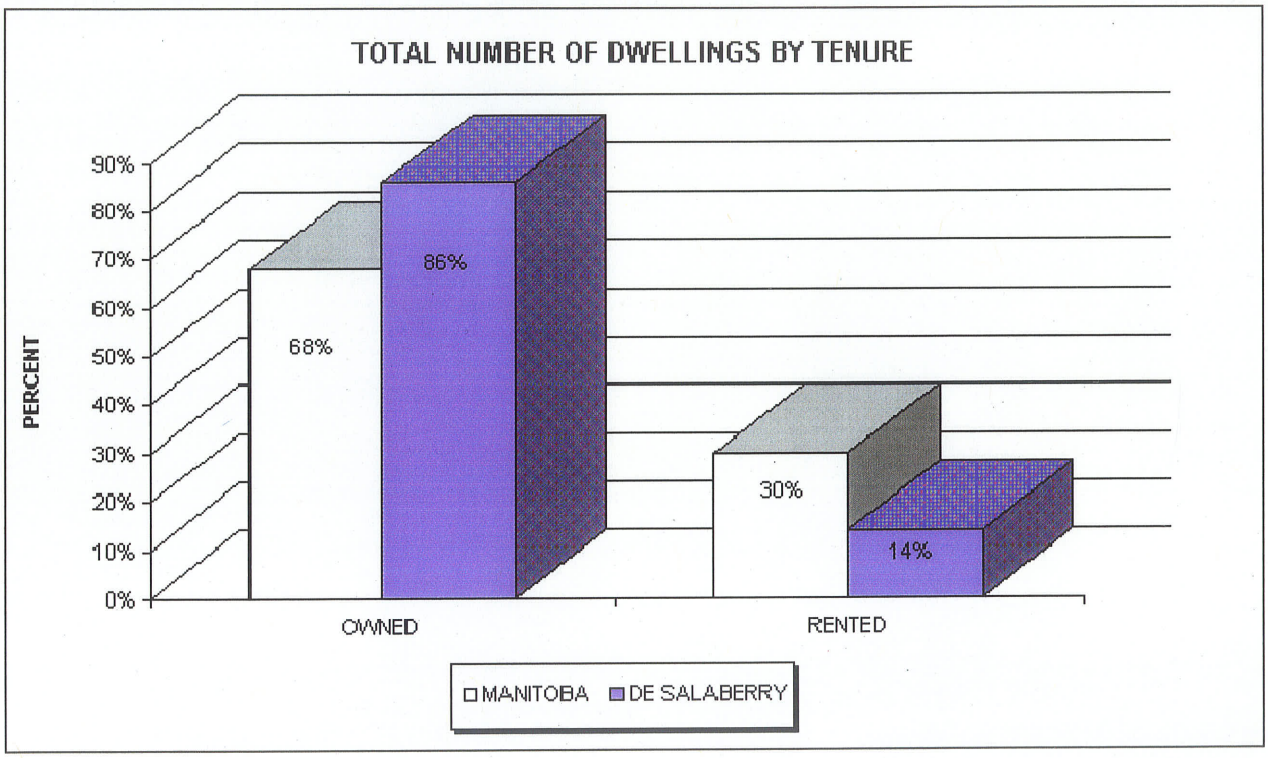
Figure 10: Highest Level of Schooling



Source: Census Canada, 2001

However, the total number of private dwellings by tenure exceeds provincial averages. Sixty-six percent of Manitobans own their own homes, while; in De Salaberry eighty-six percent of the residents own their own homes. The high percentage of homeownership makes the residents in the RM less likely to choose to leave their homes during a disaster.

Figure 11: Total Number of Dwellings by Tenure



Source: Statistics Canada, 2001

4.5 The Capacities and Vulnerabilities Analysis Matrix Results

The Capacities and Vulnerabilities Analysis Matrix is a tool by which it is possible to examine the extent to which emergency response and mitigation efforts support or subvert social and economic development in the municipality. Due to the complex and diverse nature of the overland flooding hazard, the Capacities and Vulnerabilities Analysis Matrix categorizes the factors that make the RM vulnerable and proposes a mechanism to structure priorities by which these issues can be addressed. The model being used in this study, acknowledges that there is an intricately intertwined relationship among the political, economic and social factors of the RM that when coupled with the physical characteristics of the overland flooding hazard, describe many of the underlying causes of the severity of damage caused during an event. Anderson and Woodrow's matrix adds emphasis to the conceptual framework of Montz and Tobin's model. The matrix aids in giving definition to the long term trends and factors that precede the disaster, which directly or indirectly contribute to the negative impacts caused by overland flooding. The matrix also highlights the strengths that exist within the RM among it municipal resources which future development and mitigation plans can be built upon. The analysis of the matrix draws on the relationship between principles, practice and policy complimenting Montz and Tobin's model to provide a more clear overall picture of the municipality.

The Capacities and Vulnerabilities Analysis for the RM of De Salaberry showed that there are strengths in the municipality upon which future mitigation and preparedness can be built upon. In terms of capacities, the municipality already has trained 18 firefighters to deal with local emergencies, and 11 public's works employees

knowledgeable in the construction of dykes, levees and sandbagging. The RM also has access to local farm equipment that is made available by local farmers. Constituents of the RM feel a strong sense of community and pull together when it is required. The Catholic Church is a strong supporter of community endeavors which aids to rally assistance in times of disaster. Finally, M.E.M.O. has adopted a new act and changed their regulations, forcing the RM to update their emergency plan which will in turn increase their capacities.

There are, however, areas of weakness and vulnerability. There is very little skilled labour and there are no formal mutual aid agreements with the surrounding municipalities. Also the aging state of current levees and dykes in the municipality are cause for concern. Additional vulnerabilities can be found in the social/organizational realm of the RM. The personal changes brought by a re-election vote of council every four years and council's lack of emergency mitigation, preparedness, response and recovery training hinders the ability of the RM to progress to a state of readiness. The members of council feel that with their current human and economic resource deficit that they are unable to meet the standards that are required to be considered prepared. They feel that any overland flooding event comparable in magnitude to the events of June 9-11, 2002, is beyond their scope and span of control. The media can also affect the public's perception of their local government. Their credibility can be affected negatively when the local government's lack of resources or co-ordination are highlighted. Any difference of opinion or indecision among the council members may lead to confusion on the part of the public affecting their motivational/attitudinal vulnerability. The results of the Capacities and Vulnerabilities analysis are summarized in figure 12.

Figure 12: Capacities and Vulnerabilities Results

	Vulnerabilities	Capacities
Physical/Material What productive resources, skills, and hazards exist?	• Lack of skilled labor • No formal mutual aid agreements with bordering RMs • Aging levees and dykes	• Volunteer firefighters – 18 in St.Pierre, 18 in St.Malo • Public Works Employees – 11 in RM • Local farm equipment
Social/Organizational What are the relations and organizations among people?	• Changing of council every 4 years • Lack of education/training • Council and Public Works personnel have no first aid/CPR training	• EMO act & regulations have changed forcing RM to update plans remain in the RM • Most residents • Strong community ties
Motivational/Attitudinal How does the community view its ability to create change?	• Council feels subjugated to provincial/federal initiatives • Media creates panic • View overland flooding as beyond their control	• Previous experience has pulled communities together • French Catholic church strong supporters of the community

Source: Adapted from Anderson and Woodrow, (1989).

4.6 Previous Experience

The RM of De Salaberry has experienced numerous occasions where the Rat River or Joubert Creek have spilled their banks. The events that occurred on June 9-11, 2002 were exceptionally extreme in their scope but only further highlight the underlying problems that exist in the municipality. The tables below identify the rain events, which have caused overland flooding. They are not the results of spring melt or runoff.

Table 5: Stages of Flooding

	FLOODING BEGINS	MODERATE	SEVERE	EXTREME
JOUBERT CREEK	*250 CFS* (L)*	*1000 CFS (M)*	*1700 CFS (S)*	*>2000 CFS (E)*
RAT RIVER	*500 CFS (L)*	*2000 CFS (M)*	*3500 CFS (S)*	*>5000 CFS (E)*

*CFS = Cubic Feet per Second

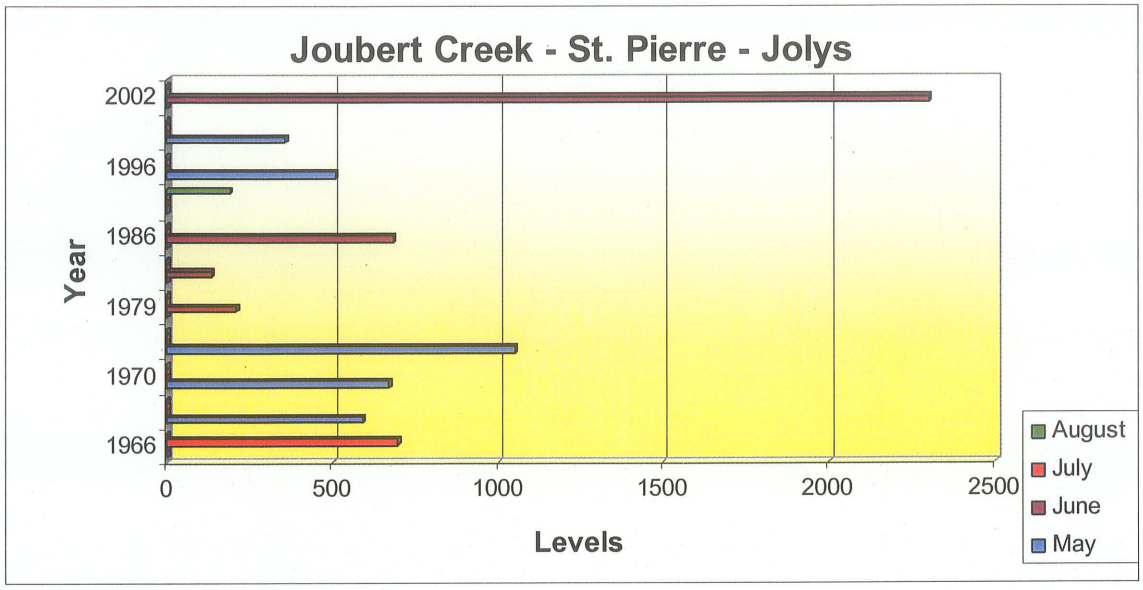
Source: Manitoba Conservation, Water Branch, 2003

Table 7 demonstrates the CFS recorded at the Joubert Creek at St.Pierre-Jolys monitoring station.

Table 6: CFS at Joubert Creek at St. Pierre-Jolys

YEAR/MONTH	MAY	JUNE	JULY	AUGUST
2002		*2300 (E)*		
2001	*357 (L)*			
1996	*509 (L)*			
1991			*188 (L)*	
1986		*682 (L)*		
1982		*136 (L)*		
1979		*209 (L)*		
1974	*1050 (M)*			
1970	*670 (L)*			
1967	*590 (L)*			
1966			*696 (L)*	

Figure 13: Recorded CFS at Joubert Creek at St. Pierre-Jolys

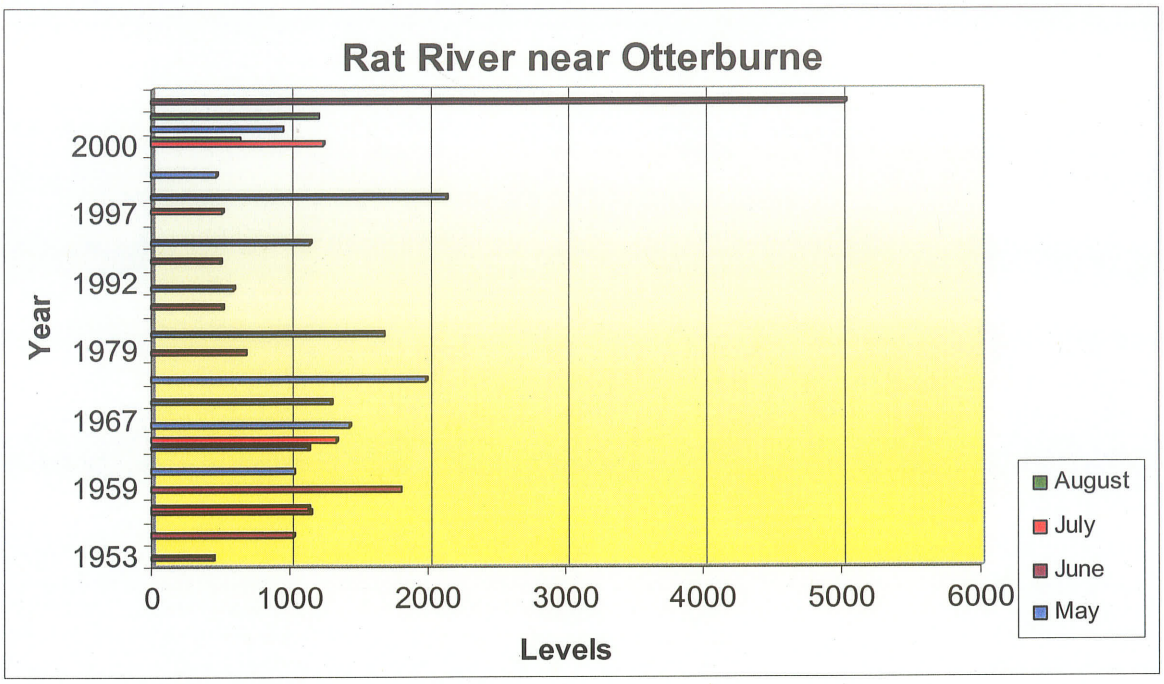


Source: Manitoba Conservation, Water Branch, 2003

Table 7: CFS at Rat River near Otterburne

YEAR/MONT	MAY	JUNE	JULY	AUGUST
2002		*5015 (E)*		
2001	*950 (L)*			*1204 (L)*
2000			*1243 (L)*	*639 (L)*
1999	*466 (L)*			
1998	*2130 (M)*			
1997			*512 (L)*	
1996	*1144 (L)*			
1993		*500 (L)*		
1992	*587 (L)*			
1991		*512 (L)*		
1986	*1677 (L)*			
1979		*678 (L)*		
1974	*1980 (L)*			
1970	*1289 (L)*			
1967	*1430 (L)*			
1966	*1130 (L)*		*1330 (L)*	
1965	*1030 (L)*			
1959		*1800 (L)*		
1957		*1140 (L)*	*1130 (L)*	
1954		*1020 (L)*		
1953		*440 (L)*		

Figure 14: Recorded CFS at Rat River Near Otterburne



Source: Manitoba Conservation, Water Branch, 2003

In the Rural Municipality of De Salaberry, the most significant consequences of overland flooding are the disruptions caused by washed out roads in to personal homes and businesses. However, the list of possible effects includes the following:

- Potential injury and loss of life;
- Damage to property;
- Utility failure – power, water, gas, sewers and telephone;
- Structural damage to homes, businesses and other buildings;
- Traffic disruption – road, bridge and rail closures;
- Food and water shortages;
- Evacuation of people and livestock;

- Crop damage;
- Potential health problems;
- Erosion of land;
- Difficulties in attaining and delivering emergency services – fire, police and ambulance;
- Isolation of communities, homes, farms and livestock;
- An overload on social services;
- Contaminated water;
- Disruption of businesses.

Given the size of the community any one of the above effects can and may have significant consequences economically, politically or socially. It is for this reason that the emergency plans in the municipality must be kept current and up to date.

4.7 Emergency Plans

At the beginning of the study period the Rural Municipality of De Salaberry had little in the way of an emergency plan. The RM followed the guidelines that the Manitoba Emergency Measures Organization (M.E.M.O) had set forth. Emergency preparedness and response is coordinated by M.E.M.O. The organization was originally founded in 1959 with a mandate to deal with nuclear war. As time and emergency events have evolved more emphasis has been placed on hazards and disasters. Today the mandate of M.E.M.O is to provide prompt and coordinated response to emergencies and disasters and to maintain a continual state of readiness. There current scope of responsibilities also includes planning, training, education and operations. The organization also holds public information programs, training exercises, and hosts an

annual emergency response conference (Manitoba Emergency Measures Organization, 2006a).

However, little aid was provided to the municipality in developing a comprehensive hazard or risk assessment and ensuing emergency plan. The emergency plan was based on a template that was downloaded from M.E.M.O and required the RM simply to fill in the blanks. The local reeve for De Salaberry is also the community's butcher and emergency preparedness is not a priority due to the sporadic nature of the overland flooding events. The council members, all of whom have full time employment in other areas have received no training in disaster mitigation, preparedness, response or recovery. Yet, the emergency response concept in Manitoba states that dealing with an emergency is the responsibility of the local authority and only when the capacity of the local authority to deal with an emergency is exceeded, the next level of response is to be activated by the local authority. Due to the lack of education and training that the local authority had received it does not take long before their capacities are exceeded.

The next level of response is any arrangements whether formal or informal mutual aid agreement or other agreements made with communities in the surrounding areas. Currently the municipality does not have any mutual aid agreements, whether formal or informal with any of the surrounding communities concerning flooding.

The next level of response is the province. Unfortunately, the RM tends to rely solely on the province when the water levels begin to rise. They do attempt to repair washed out roads and lay sand bags prior to calling the province however, media influence tends to capture the public panic and the province is called for assistance. Due to the lack of training, low level of education and low incomes many depend on disaster

financial assistance. There is very little initiative from the province to improve the community's capabilities, decreasing their vulnerability and mitigating the effects of overland flooding events. The residents in the RM attempt to prepare themselves for an emergency but often feel that they are on their own in terms of preventative guidance. The purpose of disaster assistance is to assist municipalities, businesses and individuals financially when they incur losses due to disaster that exceed the threshold which any individual, business or municipality can reasonably be expected to bear on its own provided these losses are deemed eligible. In most cases the disaster financial assistance merely provides a band-aid approach to the underlying problems (Manitoba Emergency Measures Organization, 2006b).

4.8 Disaster Financial Assistance Results from the June 9-11, 2002

The intensity of the storms that occurred in June of 2002 caused $120,285.25 in site specific damages. There were a total of 53 separate sites where damage occurred and claims were made. Of the 53 claims that were made 44 of them were made for roads that had been washed out, 3 were for bridges that had been damaged and 6 culvert/drainage ditches that were washed out. Table 8 denotes the number of roads, bridges and culvert/drainage ditches that were washed out and the dollar amount of the claim to repair the infrastructure to pre-disaster conditions.

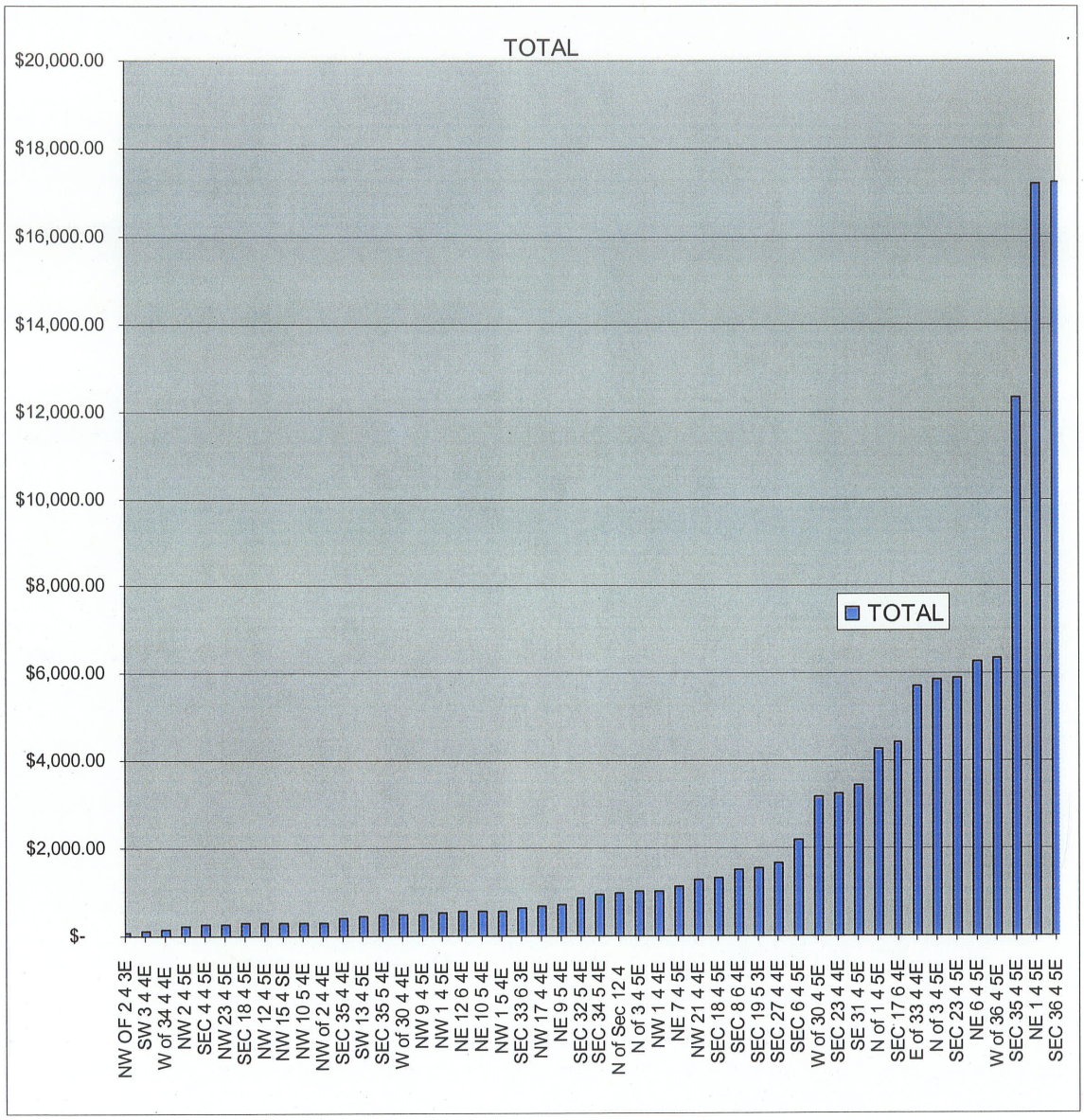
Table 8: Infrastructure Damage by Dollar Amounts

	Number Damaged	Dollar Amount
Roads	44	$98,663.64
Bridges	3	$4,407.39
Culvert/Drainage Ditches	6	$21,621.64

Source: RM of De Salaberry, 2003

According to the RM of De Salaberry's claim records, 40 of the 44 roads that were washed out as a result of the overland flooding had been repaired in the past to varying degrees from previous experience with overland flooding of some sort. This, therefore, demonstrates the municipality is applying the band-aid approach (Cutter, 1994). The bridges had received some insignificant damage in the past, however, the magnitude of the June 2002 event caused more damage than the bridges had previously sustained from prior overland flooding events. The culverts and drainage ditches in the RM are a continual problem for the municipality as Public Works frequently has to revamp the ditches through the summer months after every substantial rainfall. Figure 13 shows the location and total dollar amount of damage sustained by the public sector as claimed by the RM after the June 2002 events.

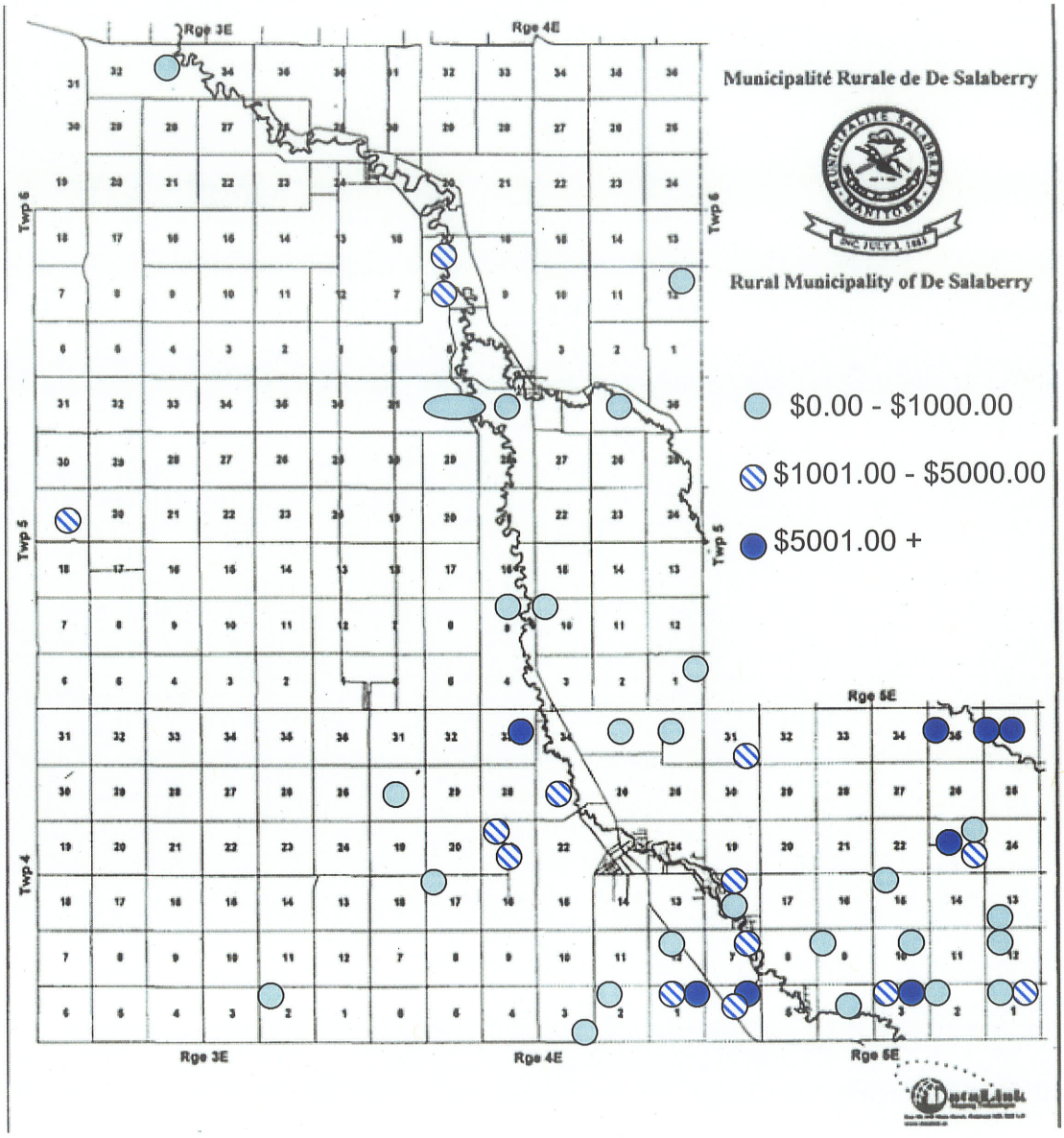
Figure 15: Total financial damage by Section-Township-Range.



Source: RM of De Salaberry, 2003

Figure 16 shows the location by Section-Township-Range where the damage occurred. The light blue circle denotes damage in the dollar range from $0 to $1000.00. The striped blue circle symbolizes damage in the range of $1001.00 to $5000.00 and the dark blue circle represents damage in excess of $5001.00.

Figure 16: Financial Damage to Corresponding RM Location



Source: Map from the RM of De Salaberry, 2003

Chapter Five: Conclusions and Recommendations

The basic premise of this study was to determine the role three keys factors contribute to the severity of damage caused by overland flooding. The three factors are current emergency plans or lack thereof, the availability of disaster financial assistance, and the role the local government plays in the disaster management continuum.

The geographic location of the Rural Municipality of De Salaberry made it a good case study example of municipal vulnerability to overland flooding. As is the case with most municipalities in the southern portion of Manitoba, the overland flooding problems result largely from inadequate drainage systems for runoff water produced by heavy rainfall from thunderstorms. The nature and scale of the overland flood hazard varies greatly from event to event. Localized storms tend to produce high intensity rainfall. When small drainage basins such as the Rat River and Joubert Creek, experience intense atmospheric convectional cells, overland flooding may result. This was the result of an intense storm system that moved through the RM June 9-11, 2002. The storm produced large volumes of water that were concentrated in both time and space. This type of flooding occurs mainly in the late spring and summer months and upon examination of the rainfall records of the municipality it is apparent that this type of event occurs every few years; the potential for damage is immense.

An overland flooding event that could be considered as an extreme event is only a significant event, from a social scientist perspective, if the flooding disrupts the built or social environments. The June 2002 event washed out roads, collapsed bridges, inundated property and breached dykes, causing over $120,000 damage to municipal infrastructure. An overland flooding event of equal or greater magnitude may have

similar physical characteristics but may not have similar social consequences. The physical event and social consequences have a relationship that is quite unstable. It is the social, political and economic factors which determine the overall gravity of any event. The Tobin and Montz Integrated Approach Model was a successful tool for examining the overland flooding hazard in the RM of De Salaberry because it incorporates elements from both the physical and social sciences to observe how different communities respond to extreme geophysical events. Since extreme atmospheric conditions can not be controlled, focus needs to be placed on the social aspects of a community to alter their potential consequences. Moreover, if the municipality reduces their vulnerabilities, they will reduce the number of events that may be considered a disaster and further reduce the scope of future events.

It was the contention of this thesis to demonstrate how attention in rural communities such as the RM of De Salaberry has not focused on the social and political processes that contribute to their community's vulnerability. Instead they continue to apply what may be viewed as the band-aid approach. Temporarily fixing problems as they arise rather than look for their root cause. In all fairness to the RM, there is very little support to undertake such an endeavour. Thus there have been no compelling reasons for the municipality to undertake what may be seen as costly mitigation efforts to reduce the potential effects of overland flooding that may or may not occur.

Certain portions of the municipality are especially vulnerable because their economic status prior to a disaster event was marginal at best. They have very few resources and do not have the financial flexibility to lessen their personal exposure to the overland flooding hazard. While improving the structural integrity of the municipal

infrastructure may help reduce the impact of overland flooding, to most this seems an impractical idea a best. Emergency management and overland flooding mitigation is only a small portion of the local council's civic duties. However, if the municipality had the financial means and a working relationship with other municipalities and other government agencies to address these issues and contextualize their vulnerability, they would then be capable of prioritizing the manner in which they may be able to commence reducing potential overland flooding impacts.

The local government in De Salaberry needs to consider areas in which their local resources, whether they belong to the private or public sector, are likely to fail or be compromised by being inundated with water. Certain areas are more likely to affected than others, leaving people temporarily homeless or unable to reach their homes or businesses due to washed out roads. They must also consider that there may be a loss of power, water, or communication systems and plan for the impact that this may pose to their capability to respond to all emergencies, whether flooding related or not, and to maintain a continuity of all other municipal functions. They need to determine which sectors will be more affected than others and what will happen to the employees of these affected sectors. Should an overland flooding event of the same magnitude as that of the summer of 2002 occur again, they must determine what services that they will be able to provide following an equal or greater event in the future and what consequences that their actions may produce. They must also consider how a disruption in services will affect their already vulnerable population and municipal infrastructure. Unfortunately, as is the case with most rural Manitoban municipalities, more focus has been placed on response and recovery than on mitigation and preparedness. However, as recent events have

shown, a business continuity plan is essential for a municipality to protect itself and to reestablish basic municipal functions in their community. Their inability to do so will cause them to remain vulnerable to the next event.

Perhaps one of the most important components in emergency planning is the local officials. They have the capacity to greatly influence every stage of the disaster management continuum. They can affect the continuum directly through these categories of mode and action: leadership, ability to act, and knowledge. These three characteristics are evident in every municipality to some extent. The following qualities are required to provide adequate response in an emergency situation.

Leadership –

- Must be flexible and creative in problem solving and decision-making
- Must have a vision of what the community should be
- Must have the ability to attract and motivate competent assistants and the local people
- Have strong links to other decision-makers in both the public and private sectors
- Have the ability to forge new relationships with other local, government and external agencies

Ability to Act –

- Have strong administrative capability: smoothly functioning administrative systems, adequate monitoring and record keeping
- Technical knowledge: involves land use control, enabling leaders to manage emergency events, mutual aid agreements and development plans
- Resources: grant money and money from outside organizations

Knowledge –

- To neither overstate nor underestimate the will of the citizens in the municipality
- Effectively use available resources

In reality, most local officials are not capable of assessing the complete picture when disaster strikes. Many find themselves with little or no knowledge of overland flooding mitigation schemes, and therefore are unable to maximize the resources that they have available to them. Due to the sporadic nature of overland flooding events, they lack the insight necessary to avert many of the consequences of the hazard. For example, the reeve of the municipality wears many different hats, from reeve to the town butcher with no formal education or training in hazard assessment, preparedness or mitigation. Members of the RM's council are equally ill-equipped to deal with a disaster event. They face re-election every four years and are often not able to receive any disaster related training. They are preoccupied by other issues competing for their attention, and are not inclined to develop the skills that are required in emergency situations. Unfortunately, they tend to rely on previously made decisions and biased beliefs from past events.

They are usually given very little information on alternative methods to mitigate their hazards and the probable effectiveness of new mitigation schemes. It is very difficult for local government authorities to deal in low-probability, high-consequence events, especially as they have little experience in dealing with such events (Mileti, 1999).

Because local officials receive little or no formal training in hazard mitigation, they rely heavily on their own past experiences. Those who have had no personal experience of their own tend to also rely on information they have received through media outlets to form their personal opinions. The media is able to conjure up a variety of emotions in

people in times of disaster, which can often result in bias opinions of the decision-makers by influencing them with visual imagery and narrative formulae. It is for these reasons that the local government should establish working relationships with the press to avoid any adverse consequences when an event should present itself. A pre-established relationship can provide the public with valuable information and allow them to be made fully aware of efforts being made to either mitigate or respond to an overland flooding event. It will also reduce the risk of rumor and embellishment being made a reality. Perception is reality to the public; therefore, it is imperative that the information being passed on by the media is accurate (Alexander, 1993). It is natural for individuals to use psychological defense mechanisms to give themselves a sense of security (De Man and Simpson-Housley, 1987). The sensationalization of a disaster by the media influences their perception of the danger and their response to it. Local officials, like all members of the community subjectively select, organize and interpret information about the overland flooding hazard. However, council's main source of information should not come from the media.

It is easy for people to draw conclusions which are meaningful to them but which are not necessarily comparable with the true magnitude and scope of the hazard or its consequences, or based on objective information provided by government departments and agencies (Asgary and Willis, 1997).

Stochastic interpretations have a tendency to be rejected by local authorities because they have a difficult time in perceiving probabilistic distributions, and also partly because they wish to reduce uncertainty so that life becomes more predictable and tolerable (De Man and Simpson-Housley, 1987).

Repressing defense mechanisms such as denial of true hazard characteristics or denial of reoccurrence are adopted by some. Some interpret hazards as environmental determinism, where people are victims of nature or that hazardous events are cyclical in nature. Apart from inducing a sense of order, this approach increases the sense of personal security. These interpretations of natural events prevent realistic adjustment because such adjustments would be inconsistent with subjective expectancies, a psychological state that council members can not tolerate (Blaikie, 1994).

The most common response to overland flooding has been to ignore the potential threat. In evaluating the relationship between the overland flooding hazard and the local authority's perception, it is essential to take into account several other factors such as past experience and the length of residence in the flood prone area. Council members who have not personally experienced an overland flooding event have no sense of personal relatedness. Therefore, they often believe that they will not be affected and may have lower anticipations of future events. In regards to the length of residence, the longer an individual has resided in an overland flooding prone area, the more experience they will have with the hazard. Experience with a hazard produces appreciation of its potential harm (Alexander,1993). Such an appreciation might influence a council member's estimation of potential damage. Therefore, overland flooding experience, length of residence, expectation of flooding, estimation of damage and actions taken to reduce the possible damage are all factors that may affect, increase and lead to higher levels of anxiety and the inability to make sound responsive decisions.

There is a need to acknowledge and build upon the RM of De Salaberry's capacities. Training in disaster mitigation, preparedness, response and recovery will

build on existing capacities and reduce the need for Disaster Financial Assistance. Needs assessments are required to determine how education and training should be provided in a way that the municipality develops expertise and skills of its own. However, education and training will not in and of itself support the municipality's need for better preparedness. An updated and annually revised emergency plan is a necessity in the RM (Herman, 1982).

The RM of De Salaberry needs additional provincial and federal aid, not only in the form of Disaster Financial Assistance, to build their capacities and reduce their vulnerabilities. There is the need for government and other agencies to understand and help foster the relationships between municipalities to develop mutual aid agreements. This will require that adequate information and training be made between RMs for better intervention and programming decisions including enhancing municipal mitigation, preparedness, response and recovery through programs, workshops and projects operating during non-crisis times. Assistance should be scaled, such that it does not overwhelm local capacity but supports it. Local governments require the confidence to resist the pressure to immediately call in the province. The municipality needs to assume as much responsibility as possible. Externally motivated large-scale assistance creates the expectation that assistance will continue thus applying the band-aid approach (Cutter, 1994).

Mitigation practices lead to a reduction in risk to the overland flooding issue, which in turn will reduce losses and stress put on the municipality when an event should occur. Perception of the constituents will also be affected by mitigation projects. There is however, a fine line between increasing their sense of preparedness and

providing a false sense of security. It is also possible for losses to increase because of the false sense of security. People will fail to put as much effort into pre-event preparedness. Therefore, it is essential that any hazard mitigation project be accompanied by an education program to broaden awareness of the issues surrounding an overland flooding event. Tobin and Montz (1997) have stated that education programs need to be offered to public officials, such as the Reeve and local council members. They believe that increased awareness can take the place of experience and improve perception. A portion of this education must focus on the redistribution of resources needed for hazard mitigation and preparedness. Motivational disintegration can also be offset by regular educational workshops. Adequate information about the hazard will increase the local government's ability to make better decisions including enhancing municipal mitigation and response capabilities.

The results of this study indicate that the local authority in the municipality requires adequate information about the hazard of overland flooding and regular education and training are critical to build their capacities and reduce their vulnerabilities. It is also imperative that mitigation strategies are adopted to prevent a continual cycle of disaster-damage-repair-disaster. Also, this research shows that disaster financial assistance does not encourage preventative change and exemplifies how assistance should come in the form of support to foster relationships between municipalities and government agencies to develop mutual aid agreements. Finally, this study demonstrates that more research is required to investigate how policy in Manitoba can be improved to better address municipal emergency management concerns.

It is also important to note that while overland flooding is a destructive, damaging hazard present in the RM, it is not the only hazard present in the municipality. There are a wide range of hazards that need to be considered to ensure broad preparedness coverage. An all-hazards approach is necessary to encompass all potential threats in the RM is required to proper ensure that emergency plans are adequate.

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