

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

By

Monica (Toni) Morris-Oswald

A Thesis
Submitted to the Faculty of Graduate Studies
In Partial Fulfillment of the Requirements
For the Degree of

Doctor of Philosophy

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ABSTRACT

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

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

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

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

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

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

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

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

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

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CHAPTER 1: INTRODUCTION

1.1 The research problem

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

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

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

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

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

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

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

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

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

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

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

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

Mitigating flood risk has traditionally been done in one of two forms- through either structural or nonstructural measures. Current flood management policy, and the common application of cost benefit analysis in selection of mitigation options, comes down heavily in favor of structural measures as the alternatives of choice. Structural measures such as dikes, reservoirs, dams, floodways etc., all modify natural processes and include construction of control devices (Jones and Shrubsole, 2001) based upon engineering analyses. They are also highly amenable to traditional cost benefit analysis. These structural measures are in contrast to nonstructural ones which focus instead upon social interventions, attempting to modify human behavior within the hazardous environment in order to minimize damages.

Nonstructural measures include such widely diverse activities as relocation of settlements, land use regulations, insurance, education programs, and warning systems. They are often more dependent upon fostering a receptive community attitude with regard to flood damage reduction and upon justifications that are not expressed in purely economic terms. For instance, justifications for new building restrictions in an area may be difficult to make in traditional cost benefit terms. Yet the justification may be possible if the analysis applies a longer time frame and includes the enormous psychosocial costs of a large future flood.

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

1.2 Context of the research

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

1.2.1 Flooding in the Red River Basin

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