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INTERACTION BETWEEN CANADIAN AND AMERICAN GOVERNMENTAL AND NON-GOVERNMENTAL ORGANIZATIONS DURING THE RED RIVER FLOOD OF 1997

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PREFACE

In the spring of 1997, the flooding of the Red River generated substantial property damage and expenditures of resources in sections of Manitoba, Minnesota, and North Dakota. In response to this devastating disaster, the governments of Canada and the United States requested that the International Joint Commission engage in an examination of the flood's causes and impacts, assess and suggest improvements to emergency response and recovery, and recommend prevention, preparedness, and mitigation strategies to reduce the impacts of future flooding in the Red River Valley. The International Joint Commission appointed the Red River Basin Task Force that same year to coordinate the investigation.

Beginning in April 1997, I began an independent research project that focused on the interaction between countries during transnational emergencies. Using the 1997 Red River flood as a case study, I examined the interaction between Canada and the United States during the disaster's warning and response phases and produced a Masters Thesis entitled *A River Runs Through It: Cross-Border Interaction During the 1997 Red River Flood* (1999). In October 1999, I was asked by the Red River Basin Task Force to write a report based on the Thesis and my research. This report describes the transnational interaction between Canada and the United States during 1997 flood and recommend ways trans-boundary warning, response, and planning might be improved in the Red River Valley.

EXECUTIVE SUMMARY

This study examines transnational interaction between Canadian and American organizations during their response to the 1997 Red River flood. In particular, the research focuses on:

1) the direction and degree of dependency organizations had on their cross-border counterparts for information and response implementation;

2) the use of formal and informal processes in transnational decision-making and communication;

3) the extent to which standardization inconsistencies affected the disaster response;

4) whether or not transnational interaction occurred primarily between centralized emergency organizations or decentralized agencies involved in flood-fighting efforts.

The analysis uses a *grounded theory* examination of cross-border agreements, agency and governmental reports, newspapers, and interviews conducted with sixty-two key representatives from principle Canadian and American organizations involved in the flood response.

The study describes the nature and frequency of the interaction. It finds that although several problems or areas of confusion developed, transnational interaction between organizations during the 1997 flood was generally successful, with respondents reporting satisfaction with the willingness and ability of their counterparts to provide information and assistance. The research also identifies ways in which cross-border interaction can be expanded and issues that should be considered before such implementation occurs. Recommendations are listed below in the order that they are discussed in the body of the text.

Recommendations
for the Red River Valley Based on
Canadian and American Interaction During the 1997 Red River Flood

Dependency Issues:

i Cross-border similarities and differences regarding the hazard threat and the actions taken to counter against it should be clearly explained to the media as these organizations serve an important role in public warning and hazard education during slow-onset disasters.

ii All lifeline service providers (electricity, gas, telephone, etc.) should explore whether they might benefit from transnational mutual assistance agreements.

iii Facilitating cross-border interaction between agencies during routine periods will improve interaction during times of disaster.

iv Further study is needed to identify ways to maintain a continuous flow of commercial traffic. Areas which should be explored include whether organizations who do not currently receive regular rerouting updates would benefit from notification and whether or not basin-wide highway electronic data bases and monitoring systems could be a useful tool in rerouting traffic and coping with differences in allowable weight on commercial truck routes.

v Organizations in each county must be able to maintain the ability to make decisions and take responsibility for actions taken within their own jurisdictions.

vi Organizations should take steps to anticipate and plan for what types of cross-border assistance would be beneficial in an emergency situation, under what circumstances, and how best it could be executed. This planning may involve some cross-border training or the documentation of formalized procedures. Before countries engage in transnational assistance, both sides should consider if such aid is really the best option available.

vii Organizations should be given support and encouraged to integrate new technologies into their cross-border emergency communications procedures and trained to maximize the benefits of these resources.

viii Support systems—e.g. resources, personnel, technologies—must be in place to ensure that adequate cross-border communication between organizations is maintained during Grand Fork's latter warning and early response phases as this is the period when American resources are stretched to their limits and when Canada's need for information intensifies.

Formalization Issues:

ix As a part of preparations for future flooding events, organizations should meet with cross-border counterparts to discuss and document successes and short-comings of the last response effort.

x Each province and state must have equal representation on cross-border boards—both in terms of membership and attendance—and information from meetings should be circulated to operational personnel within their respective organizations.

xi Organizations who currently do not interact with cross-border counterparts during a disaster may benefit from transnational board participation. Attendance could generate new networks and point to ways that cross-border interaction would benefit those agencies.

xii Transnational boards should not unduly impede upon participants' time or other activities. Instead, meetings should be limited in number and goal-focused to maximize participation across agencies and ensure effective planning and networking. In return, participants should be expected to participate in board meetings when they do take place. This involves organizations providing adequate support for them to do so.

xiii Cross-border agreements between the provincial and state governments should be pursued.

xiv Organizations involved in flood-response activities should provide their personnel with a basic understanding of existing transnational agreements.

xv Organizations should be provided with the personnel and budgeting support necessary to draft and update cross-border manuals and contact lists.

xvi Formalized agreements, contracts, and manuals need to provide structure while still allowing for flexibility, adaptive emergency response, and informality. When they do so, formal organizational structures can allow for informal interaction and operations to take place simultaneously.

xvii A transnational flood exercise should be conducted if a long lapse occurs between flood events.

xviii Exercises are often designed to test stress on the system instead of exercising a breakdown of the system. If smaller floods serve the role of testing the former, cross-border flood exercises should be used to exercise a transnational interaction during a worst-case scenario (for example, a 500 year flood).

xix The presence a Canadian liaison in American flood emergency centers to relay information to Manitoba—an International Joint Commission recommendation—would be beneficial, but only if it is implemented in a way that enhances an organization's direct interaction with counterparts rather than replaces it.

Standardization Issues:

xx Because poor maintenance or changes in one county's infrastructure can directly impact flooding effects in the neighboring country, it should be the responsibility of organizations in both countries to regularly keep each other well informed. Such changes should be integrated routinely into basin-wide hydrological models.

xxi Measures should be in place to help prevent flooding of all buildings within the joint dike when one side's electrical power shuts down.

xxii Private and public sector organizations should discuss ways their skills might be transferable across the border in an emergency situation and seek out opportunities where mutual aid is beneficial and appropriate. When cross-border assistance does occur, guides should be provided to the international teams to facilitated requests and help with standardization problems that may arise.

xxiii Organizations who anticipate that cross-border assistance may become necessary in the future should meet before an emergency strikes to discuss areas where standardization differences may prove problematic. This information should then be disseminated to operational personnel. Before cross-border personnel are sent to assist, they should be instructed to ask questions whenever directives or terminology seems unclear.

xxiv Organizations should investigate if foreign laws or regulations impact their ability to assist the other country during an emergency situation.

xxv Manitoba, North Dakota, and Minnesota should have strategic plans in place to cope with a mass influx of evacuees during an emergency. Accordingly, American residents evacuating to Canada and Canadians evacuating to the United States should be given information packets as they cross the border, outlining where they should seek assistance and information.

xxvi In an effort to prepare for future disasters, the American Red Cross should put in place procedures that provide for training volunteers who are asked to assist the Canadian Red Cross.

xxvii Transnational standardization of timing and procedures should not be insisted upon for the sole purpose of standardization. Each county chooses its methods based on its own political, cultural, organizational, and jurisdictional needs. Instead, organizations should

learn from the success or failures of their counterparts, evaluate methods used in each country, and incorporate or adopt similar practices where appropriate.

xxviii Standardization inconsistencies do not necessarily need to lead to problems in disaster response if: 1) the individuals or organizations involved are aware of the inconsistencies; 2) they are also aware of the potential consequences those inconsistencies may cause within and outside of the respective organization; and 3) they take adequate steps before the disaster to prevent problems in their response.

Centralization Issues:

xxix The decentralized system of cross-border interaction should be maintained, however, organizations should be better aware of transnational interaction undertaken by other department. Organizations who interact with cross-border counterparts should disseminate more information about this interaction to the Emergency Operations Center and to other agencies. To avoid both unnecessary bureaucracy and arbitrary decision-making about the importance of information, governmental and non-governmental organizations in each country should meet to outline what kinds of information about cross-border activity they would find helpful in fulfilling their emergency response roles.

I. INTRODUCTION

In the spring of 1997, communities in the United States and Canada's Red River Valley faced the daunting possibility that flooding would generate widespread economic losses, property damage, community disruption, and emotional trauma. Above average soil saturation and record levels of precipitation combined with an untimely snow melt (North Dakota State Water Commission, 1997; Warkentin, 1997) to transform the normally slow, meandering Red River into a massive body of water, at times, twenty-five miles wide. Consequently, the state border between North Dakota and Minnesota and the international border separating Canada and the United States were engulfed by what people in the region commonly referred to as the "Red Sea." The river took hold of the region, closed borders, and eventually merged distinct political jurisdictions into an expansive disaster-devastated region. Several communities were completely overwhelmed by the flood-waters; many more were force to evacuate their homes as a precautionary measure; almost all expended resources in an effort to mitigate or respond to the disaster.

The very definition of disaster implies social disruption and the inability of the impacted community to fulfill at least some essential functions (Fritz, 1961). In an effort to effectively cope with the disaster, a complex coordination of multi-agency, intergovernmental response must often take place (Scanlon, 1995; Denis, 1991). Although systems of emergency management typically organize according to political jurisdiction, the impact of a major disaster rarely respects political boundaries. When responding initially to first the 1997 flood-hazard threat and ultimately to the impact of the disaster, governmental and non-governmental organizations interacted not only with other organizations within their own county but also sometimes with organizations across the international border.

This report examines the transnational[1] dimensions of the 1997 flood by focusing on the interaction that took place between Canadian and American organizations during the warning and response phases of the disaster.[2] Section II provides a brief synopsis of the Red River Valley, its flooding history, and the conditions that led up to the 1997 flood. Section III describes the methodological approach employed to study cross-border interaction. A *grounded theory* framework was drawn upon to analyze multiple data sources, including: cross-border agreements; agency and governmental reports; newspapers; and interviews conducted with sixty-

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[1] The terms transnational, cross-border, and bilateral are used interchangeably throughout the document and refer interaction between Canada and the United States unless otherwise noted.

[2] Since May 1997, several cross-border task forces, boards, and initiatives have been established or have seen a change in structure and participation. For the purposes of this report, however, changes to cross-border organizational structures and interaction made after the warning and response phases of the 1997 Red River flood are not considered.

two key officials from principle organizations in both Canada and the United States. Section IV focuses on the degree Canadian and American organizations depended on each other for information and for implementing emergency response activities. Section V outlines the importance of formal organizational structures and informal relationships during this transnational disaster. Section VI considers the extent to which standardization inconsistencies affected the disaster response. Finally, Section VII examines whether or not the cross-border interaction occurred primarily between centralized emergency organizations or decentralized agencies involved in flood-fighting efforts. Each of these sections highlights several key findings (1, 2, 3...) and make recommendations (i, ii, iii...) for improved cross-border interaction in the Red River Valley.

II. THE RED RIVER VALLEY AND THE 1997 RED RIVER FLOOD

The Red River Basin lies in the upper center of North America and is an exceptionally flat stretch of prairie with several major river systems and numerous tributaries. Roughly the size of Denmark, the basin's valley section extends from just south of the South Dakota/North Dakota border north to Lake Winnipeg and spreads across substantial portions of North Dakota, Minnesota, and Manitoba. Approximately 5,000 of the basin's 45,000 square miles are in Canada; the remainder is found on the American side of the border. The Red River Valley, its many rural communities, and the major cities of Fargo/Moorhead, Grand Forks/East Grand Forks, and Winnipeg are vertically connected by the Red River, a 315 mile long (545 river miles) northwardly flowing body of water, and horizontally divided by the international boundary between Canada and the United States (see Figure 1).[3]

Five factors contribute to the flooding of Red River, including autumn soil moisture, winter precipitation, rate of the spring snow melt, timing of the south-to-north progression of the melt, and spring precipitation. Major flooding occurs along the Red River approximately every 10 years (Krenz & Leitch, 1993). The 1997 flood was more severe than most but not unusual when compared to other floods this century. A flood in 1950 forced the total evacuation of most Manitoban rural communities in the Valley south of Winnipeg and the evacuation of 85,000 residents, mainly women and children, from the city of Winnipeg (Bumstead, 1997). Prior to 1997, the 1979 flood was the largest recorded flood to impact Grand Forks after the massive 1897 flood (Krenz & Leitch, 1993). Indeed, the Red River Valley experienced significant flooding from the Red River only a year prior to the 1997 flood. The 1996 spring flooding generated peak stages that were only about one foot lower than the 1979 and 1950 floods (Warkentin, 1997).

As a consequence of the temperature differences, land run-off, and the influence of other river systems, Canadian and American parts of the Valley have different flooding histories (Bumstead, 1997). All of the spring flooding in 1956 occurred on the Manitoban side of the international border. Likewise, the 1989 flood set near record-breaking levels in the southern section of the Valley while causing very few problems further north (Krenz & Leitch, 1993).

Canadian and American communities in the Red River Valley use quite different flood protection structures. Nearly all rural communities in Manitoba's Red River Valley are surrounded by permanent ring dikes. Tremendous flood damage in the 1950s in the city of Winnipeg precipitated the construction of the Winnipeg floodway project in the late 1960s. The Red River Floodway is a man-made flood protection channel—with an average depth of 30 feet, a width of between 380 and 540 feet, and a set of submerged gates—that can divert flood-waters away from the city. In contrast with Canada, American cities and towns more commonly use temporary levees and dikes in their flood protection strategies. During flood events, sandbagging efforts are typically used to enhance dikes and levees throughout the entire region.

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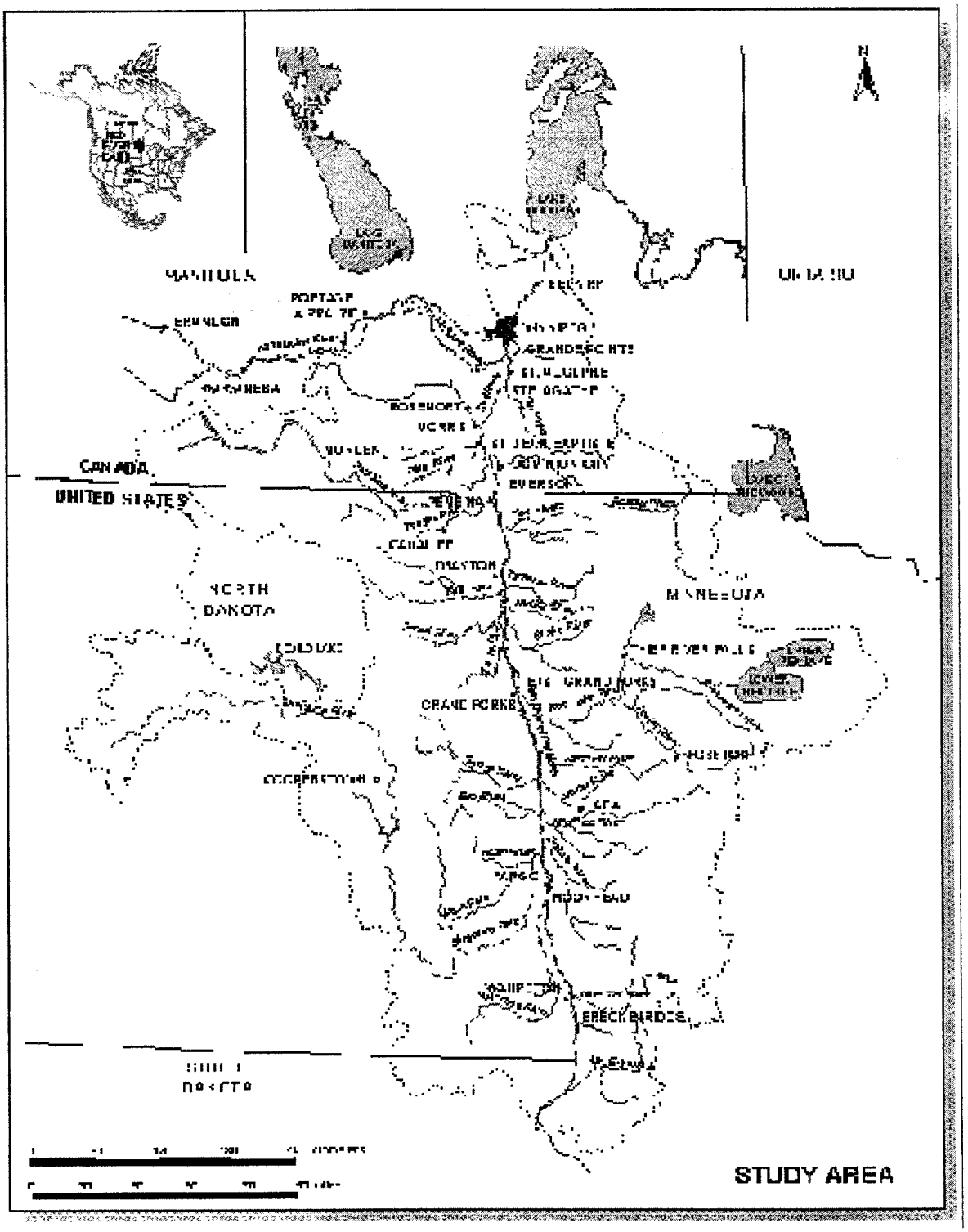
[3] The cities of Fargo and Grand Forks, ND are also divided from their respective sister cities of Moorhead and East Grand Forks, MN by the Red River.

Figure 1: Map of the Red River Valley



According to reports by Warkentin (1997) and the North Dakota State Water Commission (1997), the hydrological circumstances leading up to the 1997 Red River flood began the previous fall and continued to worsen throughout the winter and spring of 1997. Soil moisture levels were above average to well above average when the ground froze in the autumn of 1996. Several major blizzards hit the area resulting in substantial precipitation and snow cover in Manitoba, North Dakota, and Minnesota reached record levels. A late-season blizzard struck the Valley in early April. The storm and its low temperatures halted the spring thaw, dropped 10-12 additional inches of snow and ice pellets, destroyed power lines in the United States leaving 300,000 Valley residents without power, and exacerbated the flood threat. The Valley's American portion saw rapid melting on April 18-19 while the Manitoba melt was more gradual.

The National Weather Service and the Manitoba Department of Natural Resources issued flood forecasts for their respective jurisdictions as early as February 1997 and updated these forecasts throughout the threat period. Table 1 shows the northward progression of the river-crests. On April 18th and 19th, Grand Forks, ND and East Grand Forks, MN were inundated with flood-waters, resulting in mass evacuations and tremendous financial losses due to water and fire damage throughout each city. Other rural communities—such as Ada, MN (April 7th), St. Agathe, MB (April 29th), and Grand Point, MB (May 3rd)—were overcome by the river and its tributaries, as were many rural houses and farms. Over 80,000 people evacuated their homes in the Valley, and the region suffered billions of dollars in flood preparation costs and damages.[4]

[4] According to the United States Army Corps of Engineers (1998) the Greater Grand Forks area alone experienced $3.5 billion in damage. According to estimates from the Manitoba Emergency Management Organization in September 1999, Manitoba suffered over $300 million in losses.

III. METHODOLOGY

Two methods of data collection were used in the study of the interaction between Canadian and American agencies during the 1997 Red River flood: document research and in-depth interviews.

Document research began in early March 1997 and continued for approximately fourteen months, during which flood-focused newspaper articles were collected from the Winnipeg Free Press and the Grand Forks Herald. In a like manner, news articles, press releases, maps,

Table 1: Progression of 1997 Red River Flood Crest

City or Town	Height of River Crest	Date of River Crest
American Cities		
Wahpeton / Breckenridge	19.2 feet	April 16
Fargo / Moorhead	39.6 feet	April 18
Grand Forks / East Grand Forks	54.1 feet	April 22
Pembina	54.9 feet	April 26
Canadian Cities		
Emerson	792.5 feet	April 27
St. Agathe	776.5 feet	May 2
Winnipeg (with flood control measures)	752.07 feet	May 3
American levels in feet above riverbed. Canadian levels in feet above sea level.		

Source: Grand Forks Herald, 1997; Warkentin, 1997

historical data, water-level updates, pictures, and anecdotal stories were catalogued daily from flood-related Internet sites.[5] Additional information sources compiled throughout the project

[5] Sites visited daily included: The United States Geological Survey (USGS); The Grand Forks Herald Online; IN-FORUM Home page, CBC Radio Flood Stories; CBC Manitoba Flood '97 Home page; Red River Diary; The Fargo Flood Home page; The City of

include governmental and non-governmental reports, emergency response plans, and cross-border agreements. In all, the document research provided rich detail of the flood event, the communities' contexts, and their formalized emergency plans. Equally valuable, the written material helped identify the key actors in the flood-fighting effort.

Three field trips were made to the Red River Valley at three and six weeks[6], six months, and nine months after the flood's crest.[7] During this fieldwork portion of the project, I conducted in-depth interviews with sixty-two key government officials and non-governmental representatives from principle organizations on both sides of the international border (see Table 2) and attended three flood-related public meetings in Manitoba and North Dakota.[8] Interviewees were chosen because of their active involvement in and knowledge of the flood response. As the study progressed, early respondents were able to direct me towards those persons and organizations known to be most involved in flood-related cross-border interaction. For comparative purposes, similar organizations and individuals occupying similar positions on both sides of the border were interviewed.

The interview length varied considerably, depending on the extent and nature of the informant's transnational interaction during the flood. The interview times ranged between thirty minutes—the shortest interview with an informant who had little cross-border communication—and two and a half hours—the longest interview with an informant who reported significant interaction with international counterparts. The average interview lasted approximately 75 minutes.

To analyze the information I gathered in the field, I employed a technique—known as *grounded theory*—that social scientists commonly use with such data (see for example Strauss and Corbin, 1990; Lincoln and Guba, 1985). Contrary to other approaches that often impose pre-conceived notions of what is happening onto social settings, the *grounded theory* method has the decided advantage of allowing the researcher to discover meaning in a particular setting as social interactions continually change and unfold. In my case, I had an initial interest in studying the

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Winnipeg Flood Home page; The Manitoba Emergency Measures Organization Home page.

[6] On the initial field trip, Manitoba was visited approximately three weeks after the river crested in Winnipeg; while North Dakota and Minnesota were visited approximately six weeks after the Grand Forks crest.

[7] The field trip dates were May - June 1997, October 1997, December 1997 - January 1998 respectively.

[8] Senior Corps of Retired Entrepreneurs (S.C.O.R.E.) business recovery meeting, Grand Forks, ND; Mayor's Task Force on Business Recovery meeting, Grand Forks, ND; Natural Hazards Reduction Day meeting, St. Adolphe, MB.

1997 Red River flood, but early on I did not know specifically what the major focus of my research would be. However, because of the flood's severity and because I knew this was a major disaster involving two countries, I decided to take an open-ended approach, immersing myself in the field and remaining flexible enough to allow the focus of my research to emerge from my observations, analysis of documents, and conversations with key participants. It did not take long for me to recognize that cross-border interaction was an important issue to consider.

The interviews conducted during the first trip in May/June 1997 took the form of interactive conversations. Questions were open-ended, topical, and designed to elicit as much information as possible about involvement in flood-related activities. Informants were asked about all aspects of their flood-response involvement and were asked to highlight topics they felt were of particular relevance to their own activities or to the overall community response. These interviews indicated that the level and quality of interaction between Canadian and American emergency responders was an important issue that required further investigation. Interview questions were also tailored to the respondent's flood-response role. The study narrowed with each interview, and the interviews evolved into a more semi-structured format with a focus on cross-border interaction during the pre-crisis, warning, response, and recovery phases of the flood. Informants, however, were always encouraged to discuss issues they felt were important to the research topic but were not asked about directly. Two respondents who were interviewed during the first field trip were re-interviewed on subsequent field trips using a revised interview guide. In several other cases, I interviewed representatives from the same organizations I interviewed on the first trip, albeit a respondent holding a different position within the agency or department.

Following each interview and between each field trip, I identified key themes from the data provided by the respondent. Initially, I organized the data according to the phases of the disaster, grouping routine, warning, response, and recovery activities separately. As data collection and interpretation progressed, however, I identified several other organizing themes. For example, issues of standardization began to emerge, as did the direction of information and resource flow, the frequency of interaction, the nature of interaction, the degree of formality between counterparts, the degree interaction was centralized, and so on. By identifying the different ways in which important themes emerged and overlapped, my ongoing analysis of the data I was collecting generated new questions that could be incorporated into my discussions with subsequent informants. My research generated four major categories that describe transnational interaction during the 1997 flood: 1) dependency; 2) formalization; 3) standardization; and 4) centralization[9].

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[9] This report uses selective examples from the data to illustrate these conceptual categories. The examples are not meant to exhaustive list of all interaction that took place during the 1997 flood.

Table 2: Number of Interviews per Organization by Country

Interviews in Canada		Interviews in the United States	
Federal Representatives			
Emergency Preparedness Canada	1	Federal Emergency Management Agency	4
Canadian Armed Forces	2	United States Army Corps of Engineers	1
Canada Customs	1	United States Customs Service	1
Federal Government Elected Official	1	National Weather Service	2
Provincial or State Representatives			
Manitoba Emergency Management Organization	5	North Dakota Division of Emergency Management	1
Manitoba Government Elected Official	3	North Dakota National Guard	1
Manitoba Department of Natural Resources	5	Minnesota Department of Natural Resources	1
Manitoba Water Commission	1	North Dakota State Water Commission	1
Manitoba Department of the Environment	1	North Dakota Department of Health	1
Manitoba Department of Highways and Transportation	1	North Dakota Department of Transportation	1
Manitoba Department of Agriculture	1	Minnesota Department of Transportation	1
Municipal Representatives			
Town of Emerson Elected Official	1	Town of Pembina Elected Official	1
City of Winnipeg Elected Official	1	City of Grand Forks Elected Official	1
City of Winnipeg Emergency Operations Services	2	City of Grand Forks Emergency Management	2
Utility Company Representatives			
Manitoba Hydro	1	Minnkota Power	1
Manitoba Telephone	1		
Other Representatives			
Mennonite Disaster Services	1	Grand Forks Chamber of Commerce	1
Canadian Red Cross	2	American Red Cross	1
The International Coalition	1	The International Coalition	1
University of Manitoba	3	University of North Dakota	2
Manitoba Association of Native Fire Fighters	1	Mayor' s Business Recovery Task Force	1
Total Number of Canadian Interviews	36	Total Number of American Interviews	26

In the course of the research, I made efforts to add credibility to the data by triangulating data sources, methods, and perspectives (see Denzin, 1989: 93). Data sources varied from government and agency reports to internal documents to news accounts. By using multiple methods of inquiry—document research and in-depth interviews—I was able to compare statements made in confidence during interviews with what was formally revealed in official documents. Finally, in an effort to confirm information, issues that arose during interviews on one side of the border were further discussed with that respondent's cross-border counterparts. Perspectives from both Canadian and American counterparts were obtained when cross-border interaction was reported. When the lead counterpart was unavailable or unwilling to grant the interview, attempts were made to find another appropriate informant to describe that agency's cross-border interaction.

All respondents received guarantees of confidentiality to encourage candid responses to the research questions. This was necessary to encourage open and honest responses by those interviewed as public evaluations of the flood response were underway in both Canada and the United States during the data collection period.

IV. DEPENDENCY

The level of dependency matrix shown in Figure 2 illustrates the different ways dependency can manifest itself during a transnational disaster. The top row of the matrix lists three dependency levels: dependent; interdependent; and independent. For example, an organization in one country could depend on another organization across the border for information or resources. Organizations from both countries could also have a mutually-dependent relationship and rely on each other. When neither organization depends on the other, agencies are independent.

The matrix's left column outlines two areas where levels of dependency emerge:

1) organizations who depend on their foreign counterparts for information; and
2) organizations who rely on these counterparts for effective activity implementation.

Disaster-impact status reports, precipitation data, and road-closure information are three examples of information organizations may require from departments in the other country; while examples of implementation activities include involving counterparts in flood planning and response decisions, requesting assistance from foreign personnel, and requiring material resources such as sandbags or equipment. Organizations may rely on their counterparts for some information or activity implementation while at the same time be independent regarding other information or implementation activities. An organization's level of dependency for information can also differ from their implementation dependency levels. For instance, an organization may depend on a foreign counterpart for information, but implement its own response independently. Similarly, an organization's dependency level during non-crisis times could change during the warning and response phases of a disaster. That is, although one organization routinely depends on the other for information, these organizations could develop an interdependence for information or implementation during a disaster.

Using this level of dependency matrix as a model, I discuss dependency relationships between organizations that led to or eliminated the need for transnational interaction during the 1997 Red River flood. Sub-sections are divided according to the level of dependency exhibited during the warning and response phases. In each of these sub-sections, I also describe the level of dependency between these organizations during routine times. For this reason, the routine dependency level is sometimes different than the emergency dependency level sub-section I discuss it under. I then outline several information channels used for cross-border interaction. I explain how dependency levels and frequency of interaction are dynamic and sometimes change during a crisis. Finally, I consider the role competition plays in cross-border interaction when organizations demonstrate some level of dependency but still must set priorities in their planning and response efforts.

Figure 2: Level of Dependency Matrix

		Dependent	Interdependent	Independent
ROUTINE	Information			
	Implementation			
WARNING/ RESPONSE	Information			
	Implementation			

Dependent Relationships

The Manitoba Department of Natural Resources heavily relied on American organizations—such as the United States Geological Survey and the National Weather Service—for data during the warning and response phases of the flood. Information from the United States regarding precipitation, soil moisture, snow-cover, stream-flow, and American water-levels were crucial to forecasting water-levels in Manitoba. During this event, Canadian hydrologists were dependent on American organizations because the flooding moved north from the United States into Manitoba. Canadian flood forecasters were particularly reliant on American data once spring run-off and observed water-flows were underway. One respondent, however, suggested that Manitoba may have relied more on the United Stated for information in past floods than in recent years:

> There has been a good history of cooperation right back to the 1950 flood. Minutes indicate that there was good cooperation, good rapport. Some people came up for meetings. [Manitoba] was maybe even more dependent on the United States as forecasting here was [relatively] non-existent.

During routine periods, these flood forecasting organizations exchanged similar data. Manitoba's dependency stemmed from northwardly flowing rivers; while Minnesota and North Dakota depended on their Canadian counterparts for information related to rivers that flow south into the United States—including the Souris and Pembina Rivers. The level of dependency shifted from interdependence during routine periods to Canadian dependence during this particular disaster.

Because numerous river and stream systems cross the international border, Canada and the United States are mutually dependent on each other for water-quality information throughout the year. During the flood, however, the northward flow of the Red River left Canada dependent on the United States for accurate water-quality information. The Manitoba Department of the Environment depended on agencies such as the North Dakota Department of Health and the United States Environmental Protection Agency; and water-quality information was faxed and telephoned regularly to Manitoba. The Manitoba Department of the Environment was also informed when North Dakota dusted the Red River to prevent ice-jams. Beyond notification, responses to pollution threats during the flood were handled independently.

Manitoba usually does not rely on the United States for emergency supplies and materials; yet during the Red River flood, the several communities in the United States supplied its excess sandbags to the province. Strictly speaking, Manitoba was not dependent on the United States for this resource but, nonetheless, benefitted from the American offer.

In addition, Manitoba was dependent on various American media for information because:

1) they informed organizations and the public about the flood's severity; and
2) they showed Manitobans what they could anticipate.

Manitoban organizations reported they "could not afford to have another Grand Forks." Manitobans were able to view the destruction in Grand Forks as a warning. They could relate to the damage, since many Manitobans were familiar with Grand Forks landmarks, but they could distance themselves from the disaster by contending such a destructive impact "would not happen to [them]." Two Manitoban respondents described the flooding and fires in Grand Forks:

> It was a wake-up call to the general public.

> That [the flooding of Grand Forks] scared everybody because all of a sudden we [had] so much snow [from the April blizzard] and...you saw pictures of Grand Forks, it just heightened the concern. It drove people [into action.]

Manitoban organizations were able to point to Grand Forks' losses and convince people who had not yet adequately prepared for the event of the flood's severity.

1. Reporting the severity of the disaster's impact on southern communities—in this case, those first to suffer losses—can serve as a useful warning device for the general public. However, if the projected impact is worse for northern communities—those hit by the disaster at a later point in time—than it is for southern communities, media images can cause complacency.

i **Recommendation: Cross-border similarities and differences regarding the hazard threat and the actions taken to counter against it should be clearly explained to the media as these organizations serve an important role in public warning and hazard education during slow-onset disasters.**

The American electric company Minnkota Power was also very dependent on Manitoba Hydro for its response implementation. As a result of a severe April ice storm that struck the Valley only two weeks before Grand Forks was forced to evacuate, electric power lines and poles suffered severe damage and more than 300,000 people in North Dakota and Minnesota were left without power. Over 50,000 of Minnkota Power's 100,000 customers were without electrical service. Not only were many of these American households without heat, but the power loss rendered the pumps that were fighting flood waters around fragile dikes inoperable. Minnkota Power needed to restore power immediately so flood-fighting efforts could resume. Within a few days of the ice storm, over 100 hydro workers arrived from Manitoba to repair the damaged lines.

Manitoba Hydro's involvement with Minnkota Power stemmed from their recent mutual aid discussions during the year prior to the ice storm. In general, Manitoba Hydro benefits from ensuring Minnkota Power lines are operable. As this Manitoba Hydro employee explained:

> We export power to those [American] utilities and so we have a vested interest in their well being as do they ours.

The Manitoba utility company supplied power to North Dakota and Minnesota, and used American power lines to sell electricity to states further south. It was, therefore, in Manitoba Hydro's best interest to enter into an agreement to assist Minnkota Power in an emergency. Because Minnkota Power was a relatively small company, it benefitted from outside assistance in a disaster. The proximity of Manitoba Hydro to Minnkota Power facilitated a rapid response. One Minnkota Power employee estimated the length of time it would have taken his company to repair the ice storm damage without help:

> We figured [it] out one day—the man hours it would have taken just our workforce to do [those same repairs]. [It] would have taken us at least three years of twelve hours a day.

Mutual dependence was the catalyst for the formation of a cross-border mutual assistance group. Larger power lines that send Manitoba electricity to the United States were not impacted during the April storm; however, Manitoba still provided response assistance, equipment, and poles. According to one American utility worker:

> Those big power lines stayed in service but [Manitoba Hydro] still came and helped us put our smaller voltage stuff up, you know. So it was like their desire to form that group, to get that group going [was to] ensure the integrity of those three Canadian power lines, but it even went beyond that. We developed such a relationship that [they said] "we are going to help you [anyway]."

Again, a shift occurred from mutual dependence during routine periods to dependence by one country on another because of where the disaster struck first.

2. Transnational assistance can prove faster than relying on trans-provincial or trans-state assistance and sometimes stems from vested interests each side has in the other's well-being.

ii Recommendation: All lifeline service providers (electricity, gas, telephone, etc.) should explore whether they might benefit from transnational mutual assistance agreements.

The consistency of the dependency-relationships is perhaps related to the consistency in organizational structure between agencies that interacted transnationally during the flood. For the most part, cross-border interaction occurred between what Dyne's (1970) terms established (routine tasks and old structure) and extending (non-routine task and old structure) organizations. When an expanding (routine tasks, new structure) organization did interact, its new structure was still tightly coupled (Perrow, 1985: 7) to the existing structure. Consider Manitoba Hydro's interaction with Minnkota Power following the April ice storm. The repair tasks Manitoban crews engaged in were routine, albeit in another jurisdiction. The organizational structure of the on-site response in the United States shifted from a response by a single American utility company to a combined transnational effort; yet this shift was influenced, in part, by agreements made between the electric companies prior to the event. In addition, the primary organizational structures of the electric companies remained the same throughout the flood. Because all of the organizations were established, expanding, or extending, they had pre-established interaction patterns on which to model their disaster interaction. Consistent with Quarantelli and Dynes (1977), many of the non-routine transnational demands placed on organizations during the 1997

flood were extensions of regular activity and interaction, which in turn produced relatively little organizational change.

None of the organizations I spoke with that had interacted transnationally during the warning and response phases of the flood were emergent (non-routine tasks and new structure). Instead, emergent organizations, such as the Mayor's Business Recovery Task Force in Grand Forks, participated in transnational interaction during the recovery phase. The period between the disaster's initial impact and the reconstruction period allowed these organizations sufficient time to 1) develop a basic organizational structure; 2) direct attention away from local disaster response to recovery; and 3) reach out to organizations outside their own jurisdiction.

3. Cross-border dependencies between organizations during the flood were closely connected to and often paralleled dependent or mutual-dependent relationships present during routine periods rather than emergent relationships developed during the disaster, although the direction of the dependency sometimes shifted during the emergency period.

iii Recommendation: Facilitating cross-border interaction between agencies during routine periods will improve interaction during times of disaster.

Interestingly, a joint Canada/United States dike surrounds the towns of Emerson, MB and Noyes, MN. The majority of this permanent dike surrounds Emerson; however, a United States Customs Service office and several Minnesotan houses are also protected by this structure. The dike was constructed in the 1980s out of a bilateral initiative following the 1979 Red River flood and has been used on numerous occasions to protect the two communities from flooding. Emerson emergency personnel and regional operations staff from the Manitoba Department of Natural Resources closed and monitored the entire dike during the Red River flood. Manitoba notified the St. Vincent Board of Authority in Minnesota of the closure and the United States sent someone to ensure the closure was made. From that point onward, Manitoba personnel were responsible for the communities within the dike. Two Canadian respondents explained how this responsibility impacted cross-border interaction:

> You talked to some [Americans]...and they became Canadians during the run-off. They come under our rule, actually. The RCMP, in fact, patrolled that area as well. For evacuation purposes...they abide by our rules.
>
> Our emergency measures plan had priority over sovereignty. The U.S. residents that were sitting on U.S. soil in the United States were asked to leave, or evacuate, and they weren't given any choice....Everybody there, I guess, had faith in our system and did go. But really, I think it would have been a challenging situation, I mean, [if Americans were] evicted from their own houses on U.S. soil by Canadians.

But as another respondent explained, residents of these border communities grew up together and American residents recognized that cooperation served their interests:

> Their residents there and ourselves, we've sort of grown up together. [Cooperation] only makes sense. I think those people realized that if their houses were going to be saved, they're going to have to cooperate with the Canadian side....That border point virtually disappeared. We really moved in and out of Noyes and Minnesota just like Canada during the flood.

Because Emerson and Noyes became an island unto themselves during the Red River flood, American residents depended on Manitoban organizations to assess the need for evacuation and protect property throughout the crisis.

Interdependent Relationships

Because the Red River Valley is prone to severe winter storms, provincial and state departments involved in highways and transportation routinely share information regarding highway conditions and coordinate road closures. Daily operations often necessitate dependency; and, when the disaster struck, this reliance not only persisted but escalated. Canadian and American customs offices, transportation departments, and trucking companies remained mutually dependent during the flood because the disaster forced the closure of primary transportation routes and border crossings. Coordination and regular updates between these organizations were vital as the Midwest is a major trade-belt for both countries and continuity of traffic flow is crucial for the regional economy. One respondent discussed how communication and cooperation remained the focus of these organizations:

> We say our theme was "we have to be able to get the pigs to market." There's a natural flow of goods and commodities that come from the U.S. side to the Canadian side and vice versa....We had to come to some understanding with our counterparts...as well as ourselves, to come to grips with when we would move [the Canadian and United States Customs offices to an alternative location and reroute traffic.]

Other organizations—including both the military and the Canadian and American Red Cross agencies—also received road closure plans to aid in their own response planning.

4. Continuity of commercial traffic is vital to the economic health of the Red River Valley and is an important consideration during a flood event.

iv Recommendation: Further study is needed to identify ways to maintain a continuous flow of commercial traffic. Areas which should be explored

include whether organizations who do not currently receive regular rerouting updates would benefit from notification and whether or not basin-wide highway electronic data bases and monitoring systems could be a useful tool in rerouting traffic and coping with differences in allowable weight on commercial truck routes (discussed further under Section VI).

The border communities of Pembina, ND and Emerson, MB depended on each other for information. Two respondents said they often compared forecasts and used the activities of the other community—such as evacuation and return—as a gauge against which to measure their own activities:

> I got everything I ever wanted from Emerson. I just had to call and they were...just wonderful....There was always someone there on the phone to answer [questions] and to tell us what they were doing. And it's good to be able to get a little support or advice.
>
> I called [Pembina regularly] to see what was happening.

When Pembina evacuated, the town offered their sandbags to Emerson. In turn, Emerson helped North Dakota residents load sandbags while their Canadian workers were loading their own bags. These American and Canadian elected officials recalled:

> At the time, we left the extra sandbags and it was a way of helping Emerson.....They didn't take that many, and then they helped load up, a few of the rural people who came to get sandbags, they helped them load up and it worked out fine.
>
> We sent trucks in from Canada—again, with no customs clearance. We went to Pembina and got three semi-loads of sandbags....As we were loading our trucks, there were some residents from outside Pembina. They were coming in with their pick-up trucks to get sandbags. They didn't know how to run the pallet fork so our operator would stop taking, putting sandbags in our trailer, and go over there and put one in the back of [their truck] and then go back to load and then turn around and then another farmer would come....There was no country there. They weren't saying, "Hey, what's that Canadian doing driving our forklift!" They were just happy for someone to put a pallet of sandbags on the back of their truck and away they went.

Some American citizens who depended on Manitoban hospitality actually assisted another Canadian operation. According to one respondent:

> Prior to [Emerson's] evacuation, we had people from Grand Forks [who had] already lost their homes [who] were heading to Winnipeg. I guess to take the invitation of Mayor Thompson and I guess some of the service groups here to stay [in Winnipeg]. [They were] coming up [Interstate 29] and, seeing the sandbagging initiatives from the duty free shop, pulled in and stopped, took their shirts off, and started sandbagging with us. And they said, "We already lost our homes. We've got nothing to do once we get to Winnipeg. We wouldn't mind, you know, spending six to eight hours here helping you guys on the way."....So there were Canadians and Americans working side by side.

Canada and the United States assisted each other when such activities served the overall interests of both countries, and because, over time, the social or economic ties within the region have produced a sense of affinity between the province and the states. Three respondents elaborated further:

> Minnesota, North Dakota, and Manitoba are probably [more of a] community than we are with let's say some of our sister provinces. You know, like it or not, that's the truth. A lot of camaraderie and a lot of common ground.

They're very good neighbors to us.

> A lot of Manitobans and Winnipeggers go to Grand Forks to shop or just to have a get away, and similarly, so do Grand Forks people come to Winnipeg. In some ways there's more affinity between these two cities than there is, you know, across [the country].

Manitoba, North Dakota, and Minnesota are physically and symbolically connected by the Red River. Valley residents viewed these three sub-national governments not only as adjoining jurisdictions but also as neighbors. Generally speaking, Canadians and Americans were willing to do what they could to help their neighboring country. These instances of cross-border assistance occurred on individual, collective, and organizational levels, and were particularly evident in border communities.

Independent Relationships

Although hydrologists relied on each other for information, actual flood forecasting was conducted independently. Two respondents explained the need for separate forecasts:

> We have our own method....We don't have to be tied to their schedule. We can put out a forecast any time we want.

> They do their forecasting [and] we do ours. We wouldn't dream of telling them that we think they're wrong. The methodologies are quite separate.

At one point, Manitoba rejected a measurement provided by an American organization that would have seriously altered the Canadian predictions. Manitoba did not debate the measurement; they simply did not change their forecasts. In the end, Manitoba was correct in discounting the measurement; however, as one respondent explained:

> You don't want to create hard feelings 'cause the next day you need them for something else....It's just a judgement thing. Once you [keep changing your forecasts] people lose confidence in you. You lose credibility.

Respondents valued their autonomy in making final decisions because, in the end, each organization is responsible for the consequences of the forecast generated within their respective jurisdictions. Ultimately, the independence of hydrologists from their counterparts in calculating and issuing flood predictions actually allows forecasters the opportunity to use the other organization's prediction for the international border area as an accuracy reference. One hydrologist explained further:

> If you are working by yourself, you can get a little nervous sometimes that you might have overlooked something....[Canadian and American offices] can discuss these things and [we] do.

5. Organizations share information and use each other as a gauge to check predictions, strategies, and preparations; however, they value the ability to generate their own forecasts.

- **Recommendation: Organizations in each county must be able to maintain the ability to make decisions and take responsibility for actions taken within their own jurisdictions.**

After the flood subsided in Grand Forks, the National Weather Service offered to come to Manitoba and assist the Manitoba Department of Natural Resources with the Manitoban forecast. This offer was declined because the Canadian organization was dependent on the Americans for

information, not decision-making and implementation, and felt the Americans could better provide this information from the United States. One respondent explained:

> The Americans actually offered their help to come [to Winnipeg] after the flood went through Grand Forks, but we declined it because the problem is that we are so busy [during the flood response that we didn't] even have time to have someone to come in and explain the ropes to them—every second counts. [I said to them], "The way you can serve me best is to give me the best possible forecast and peak discharge and I think you can do that better where you are right now."....[But] they made the offer, which was above and beyond the call of duty.

Because mutual assistance was not planned for prior to the disaster, provision of American personnel might have harmed Manitoba's response efforts if time was taken away from important tasks to acquaint incoming foreign personnel with tasks, locations, and procedures.

Other agencies—such as the military organizations and city municipal offices—worked independent of their counterparts. Although military organizations interacted and conducted joint training exercises during routine periods, political sovereignty issues deter cross-border assistance during disasters. As this respondent explained:

> [There was] no need really for any foreign troop support [but] I don't think you would see it....I think it's more a sovereignty thing....I think [joint operations work] more from a collective defense from an aggressor than [during] an emergency....I think it's more the conception of foreign troops being on your soil, regardless of whether they are there to help or not, [that would prevent joint operations].

Although Canadian and American armed forces engaged in joint training and have formal agreements for assistance from aggressor attacks, political issues related to a foreign military presence would likely prevent emergency mutual aid in any Canadian/American transnational disaster.

Other organizations that responded independently demonstrated little dependence during routine periods and indicated cross-border interaction was unnecessary for their response efforts. Canadian organizations that operated independently throughout the flood and did not communicate with foreign counterparts were, to some extent, still indirectly dependent on third-party information about the flood's severity coming from the United States.

6. Although some forms of opportunities for transnational assistance are advantageous, support from cross-border organizations is not always necessary, politically feasible, or the most effective course of action.

vi **Recommendation: Organizations should take steps to anticipate and plan for what types of cross-border assistance would be beneficial in an emergency situation, under what circumstances, and how best it could be executed. This planning may involve some cross-border training or the documentation of formalized procedures. Before countries engage in transnational assistance, both sides should consider if such aid is really the best option available.**

Information Channels

Channels of communication included conference calls, map exchanges, and routine faxing. Organizations involved in rerouting traffic held planning meetings during the warning phase. Most communication, however, was by telephone. Cellular telephones played an important communication role during the 1997 flood, however, most of the benefits derived from this technology resulted from within-province or within-state interaction.

Access to innovative technologies such as the Internet has changed the form of dependency interaction between the Canadian and American organizations. Hydrologists, for example, had access to some flood-related data through agency home-pages on the Internet. Hydrologists do not pay for this data as it is readily available to the public. According to one hydrologist:

> The Internet has replaced [the need for] a lot [of] that phoning three times a day. Now [phoning] is reserved for unusual problems [such as] "How are the ice conditions on the river? Has it broken up yet? Have you got a new forecast...recently?"

Other agencies used the Internet to obtain status updates and road closure information. But this respondent added that nothing can replace the need for direct contact when items need clarification or more detail:

> You simply can't do everything on the Internet as well as you can on the phone. In the final analysis people still revert back to the phone—when the heat is really on.

7. Improvements in new communication technologies—such as the Internet—have enhanced cross-border communication, however, they do not replace the need for direct personal contact, either in person or by telephone, in all situations.

vii **Recommendation: Organizations should be given support and encouraged to integrate new technologies into their cross-border emergency communications procedures and trained to maximize the benefits of these resources.**

Organizational Priorities During a Disaster

Other research on disasters indicates that governments often enter into competition with each other for resources when several jurisdictions suffer disaster impacts simultaneously (Winslow 1996). This finding did not hold true for transnational interaction during the 1997 flood. Canadian and American organization did not compete with each other for resources because they did not seek resources from common agencies. Not only was cross-border competition not a factor during the Red River flood, but instead, organizations offered cross-border assistance. These organizations did, however, manage their internal responsibilities before they helped their foreign counterparts.

Even when organizations cooperated during the disaster, they sometimes had to make decisions about when they could assist cross-border and when their priorities must instead focus on their own jurisdiction. For instance, when Grand Forks and East Grand Forks were threatened by the Red River, American forecasters were preoccupied with updating predictions for these cities instead of revising forecasts for cities further north. Although this delay proved problematic for Manitoban hydrologists attempting to assess the Red River's potential severity for Emerson, MB, they understood that their American counterparts first needed to take care of Grand Forks. A Manitoban respondent recalled:

> We knew they were in the hot seat and that we had a little more time. We didn't complain as they have to look out for their number one. There was a bit of time there when we were watching what was happening further south. Meanwhile we had to revise for Emerson. We did what we could with what was available. But then when Grand Forks unfolded, I was pretty hard pressing on them for an update...and at that point they jumped into action and gave us pretty good service. They in fact set up a system where they would phone us twice a day and provide their assessment.

Manitoba understood that the Americans needed to look after their priorities first, even though update information was vital to southern Manitoba's forecasts; however, the American organizations also realized that they needed to assist Canada as soon as was reasonably possible.

Another respondent from a department that was mutually dependent on its counterparts during the flood recognized that even their organization maintained a level of independence when their American counterpart's office and Grand Forks flooded:

> You have to be very independent when it comes down to it. You have to worry about the eggs in your own basket, and that's understandable.

This Manitoba Hydro employee echoed this sentiment:

> We had an ice storm situation occurring in our province at that time so we said, sure we would [help], but we have to wait until we clean our mess up first. So we did that and we sent about a hundred staff...down there for three to four weeks.

Both Canada and the United States understood that their own jurisdiction took priority and that they were first accountable to their own organizations, but they were willing to provide assistance to the United States immediately thereafter. Fortunately, no problems developed from the short delays during the 1997 flood.

8. Organizations understand that each country must first address issues within their own jurisdictions before they can assist organizations in another nation; however, these same organizations come to the aid of their counterparts as soon as they are able to.

viii **Recommendation: Support systems—e.g. resources, personnel, technologies—must be in place to ensure that adequate cross-border communication between organizations is maintained during Grand Fork's latter warning and early response phases as this is the period when American resources are stretched to their limits and when Canada's need for information intensifies.**

V. FORMALIZATION

Formalized Organizational Structures

Several established and formalized organizational structures influenced transnational interaction during the Red River flood's warning and response phases. These structures included: 1) planning meetings; 2) transnational boards; 3) written agreements, service contracts, and procedure manuals; and 4) cross-border exercises.

Cross-Border Planning Meetings

Agencies involved in flood forecasting, transportation, customs, and pollution control held planning meetings during the warning phase—as early as several months and as late as several weeks prior to the disaster—in preparation for the spring flooding. Take for example planning meetings held by Canadian and American highways departments, customs agencies and brokers, and major trucking carriers. Several weeks prior to the flood crest's arrival at the international border, these organizations met to discuss maps, road elevations, road closures, contact arrangements, and alternative traffic routes. To limit scheduling time and meeting size, only the larger trucking carriers were invited to join the government agencies and departments at the meetings. The larger carriers had the responsibility of informing smaller trucking carriers of the rerouting plans established. These American highways and customs representatives explained some of the planning in which they were involved:

Highways Respondent:

> And then we laid out a whole bunch of plans. If it gets so high, then we lose [Interstate] 29; and then we went to the next road to the west; and then the next road to the west; and kept going until we had a way to go [around the flood].

Customs Respondent:

> We had several meetings with our Canadian counterparts, and we had decided on where we would divert the traffic to and we had decided on the times, one way or another. There was a lot of pre-planning in the interim. I guess we started working and meeting three weeks before [the flood].

Agency and department officials who met during the warning period anticipated the flood's impact and took advantage of what preparation time they had. These planning initiatives generally consisted of one or two meetings in which relevant data, procedures, and contact information were shared. Agencies and departments typically did not meet with their cross-border

counterparts again during the response phase. Although flood-forecasters did meet to discuss the event with each other in the months following the flood, other organizations did not meet during the recovery period after the disaster to debrief about the flood response. Respondents from these groups felt they were "too busy preparing for next year" to meet and that "life goes on." Priority was given to meetings for future events and not to meetings designed to review past disasters.

ix **Recommendation: As a part of preparations for future flooding events, organizations should meet with cross-border counterparts to discuss and document successes and short-comings of the last response effort.**

Transnational Boards

The transnational boards relevant to this disaster can be separated into three distinct categories based on their focus: 1) those that focused on general emergency-related issues; 2) those that were hazard-agent-specific in their focus, or in this case, that concentrated on issues related to the Red River; and 3) those that were not hazard-agent-specific in their focus, or, whose focus was not specifically related to the Red River. The Prairie Regional Emergency Management Advisory Committee (PREMAC) is the primary emergency-related board in the region with American and Canadian representation. PREMAC has provincial and federal emergency management representation from three Canadian provinces, state level representation from three states, and American federal representation from two FEMA regions.[10] PREMAC meets annually to provide a forum to receive, review, and resolve emergency management issues, advise on emergency preparedness and response, as well as encourage the preparation and implementation of emergency plans within the region (PREMAC, 1997). Membership in PREMAC is reserved for state, provincial, and federal region emergency management executives. Although other cross-border regional emergency management advisory committees have existed for several years, PREMAC was established just before the 1997 flood and, therefore, had not yet developed a history of interaction or activity.

Boards that concentrate on issues related to the Red River include but are not limited to: The International Coalition (TIC); the International Red River Pollution Board (IRRPB); the Red River Water Resource Council (RRWRC); the Red River Basin Board (RRBB); and the International Joint Commission (IJC)–which assists governments in finding solutions to problems in the many rivers and lakes that lie along or flow across the international border.

Most of these groups allow for formal discussion and planning, and some—such as the IRRPB and the IJC—have formal cross-border agreements or guidelines for action. Cross-border

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[10] Provinces include Alberta, Saskatchewan, and Manitoba.
American FEMA Regions include Region V and Region VIII.
States include Montana, North Dakota, and Minnesota.

participation varies on these boards. The IRRPB, for example, has equal representation from each province and state and reports annually to the IJC on matters relevant to its mandate. Other organizations, like the Red River Basin Board, have a more general scope of interest, are more open in their membership, less stringent on mandatory participation, and experience difficulties establishing equal Canadian representation at their meetings (Red River Water Management Consortium). One respondent was particularly concerned that participation on some of the boards was "overly American." The Central North American Trade Corridor Association and the Red River Trade Corridor Association are among the organizations that are not hazard-agent specific in their focus. Other examples of organizations that are not focused on the Red River include boards that manage and discuss water issues related to the Souris and Pembina rivers. Although these groups do not focus their efforts directly on the Red River System, participation in these associations by people active in the Red River flood response resulted in informal networks used during the flood event. One town mayor elaborated on the network potential of the Trade Corridor meetings:

> Through liaison we're finding we're all neighbors, sharing the highway, sharing the river so to speak.

All three board types provided a good opportunity for networking, and, with the exception of the boards that were not hazard-agent-specific, all of the boards enhanced overall planning for flooding of the Red River. The boards and committees in place at the time of the 1997 flood established networks that were used for informational exchange. These boards were less often used to enhance networks for response implementation. Because of their executive level positions, individuals active on PREMAC played only a peripheral role in transnational operational interaction. Instead, their established networks generated points of contact for informal informational inquiries. Elected officials and respondents from departments that concentrate on the river system were most aware of and active on Red River focused and non-Red River focused boards. Flood-response actions taken by the elected officials and representatives from departments with river-related responsibilities reinforced the networks formed or strengthened as a result of their board participation. These respondents also held slightly more operational and operational-related decision-making positions within their respective organizations than did PREMAC members and, therefore, participated more actively than executive level respondents in flood fighting response efforts. However, not all operationally active respondents who interacted cross-border sat on transnational boards and committees. After the 1997 flood, many boards had post-flood meetings. Several Canadian respondents who were involved in an operational capacity indicated that although executives from their agencies attended cross-border post-response meetings, they themselves would have also liked to "debrief" or "compare notes" with their American counterparts. Department representatives—such as highways, customs, and several non-governmental organizations—who were important to the flood response but whose tasks were less centered on the river system were considerably less knowledgeable about formalized boards.

10. Transnational boards provide a good opportunity for network building and overall planning.

x **Recommendation: Each province and state must have equal representation on cross-border boards—both in terms of membership and attendance—and information from meetings should be circulated to operational personnel within their respective organizations.**

xi **Recommendation: Organizations who currently do not interact with cross-border counterparts during a disaster may benefit from transnational board participation. Attendance could generate new networks and point to ways that cross-border interaction would benefit those agencies.**

Although Valley officials recognized the importance of transnational boards, many could not afford to spend the time needed to attend non-mandatory meetings during non-crisis times, particularly when they must travel several hours to attend. Several respondents felt that because of time constraints and multiple requests to participate on a variety of the above mentioned boards, they could not commit to regular participation:

> [I] can't afford to give up the days to attend meetings. [I] rely on other people thus far.
>
> I just don't have the time to attend all [the meetings].

Inconsistent participation limited the boards' potential for interagency networking and the planning was left to those who could regularly attend. As a result, not all organizations were represented at all meetings, nor did all organizations have an opportunity to network with organizations across the international border.

xii **Recommendation: Transnational boards should not unduly impede upon participants' time or other activities. Instead, meetings should be limited in number and goal-focused to maximize participation across agencies and ensure effective planning and networking. In return, participants should be expected to participate in board meetings when they do take place. This involves organizations providing adequate support for them to do so.**

Transnational Written Agreements, Contracts, and Manuals

Numerous formalized cross-border agreements were in place during the flood. For example, a 1909 treaty exists between Canada and the United States regarding boundary waters.[11] Due to this treaty, the IJC was formed in 1909 to resolve water-related disputes. Another important agreement between Canada and the United States, signed in 1986, outlined comprehensive civil emergency planning and management assurances.[12] Articles governed by this agreement include the facilitation of evacuee, emergency personnel, material resource, and equipment movement; the treatment of foreign evacuees; requests for cross-border assistance; charges for assistance; and the structure and mandate of transnational groups—of which PREMAC is one. The joint ring dike surrounding Emerson and Noyes falls under its own extensive guidelines.[13] Yet another agreement consists of service contracts between the Manitoba Department of Natural Resources and the National Weather Service for airborne gamma snow surveys. The United States has the responsibility for collecting the surveys for the majority of the Red River Valley, since the majority of the Valley lies south of the international border. In an effort to conduct the surveys concurrently and ensure an accurate reading for the entire Valley, Manitoba pays its American counterparts to collect the Canadian data.

Many government officials active in the flood response were unfamiliar with the 1986 transnational agreement on emergency management between Canada and the United States or cross-border agreements between agencies other than their own. Other officials confirmed knowledge of the existence of these agreements but were unable to recall any specific items included in them. Respondents most knowledgeable about the 1986 agreement were from the customs and emergency management agencies. Representatives most familiar with the Emerson/Noyes joint ring dike were the Manitoba Department of Natural Resources operational staff who worked on the dike, county emergency management personnel in Minnesota, and elected officials from the two border communities. Interestingly, this lack of knowledge about transnational agreements did not seem to impede response efforts during the flood. Although this study did not discover any response challenges associated with an organization's lack of knowledge about transnational agreements, it is easy to hypothesize how it could prove problematic were certain circumstances to change. Problems might arise if someone new to the response and unfamiliar with the transnational agreements was to refuse to comply with a

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[11] Treaty Between the United States and Great Britain Relating to Boundary Waters, and Questions Arising Between the United States and Canada. Ottawa, Canada - Washington, D.C. January 11, 1909.

[12] Agreement Between the Government of Canada and the Government of United States of America on Cooperation in Comprehensive Civil Emergency Planning and Management - Ottawa, ON April 28, 1986.

[13] Operations and Maintenance Manul: Town of Emerson Flood Protection Works, October, 1994.

protocol unknowingly; if one agency was to assume another agency would accomplish certain tasks, unaware of that agency's additional responsibilities to the other country; or if an agency were to assume a cross-border agreement addressed certain issues when, in fact, it did not.

xiii **Recommendation: Cross-border agreements between the provincial and state governments should be pursued.**

xiv **Recommendation: Organizations involved in flood-response activities should provide their personnel with a basic understanding of existing transnational agreements.**

Several departments had developed manuals that outlined contact information and procedures for interaction with foreign counterparts. For instance, the IRRPB maintains contact lists and a plan for spills of any pollutant that has the potential to adversely impact the Red River. Other departments were without such written guidelines. Despite their regular interaction, hydrology departments had little time to devote to putting together such a manual. One hydrologist agreed that a user's manual would prove useful if someone else would suddenly have to step in during an emergency. Such a document could delineate when information should be sent and received, as well as which agencies and people to contact. However, he added that any available time is devoted to forecasting improvements, not documentation. Agencies are often overburdened with their operational responsibilities. Preparing written documentation for what they themselves know as routine is sometimes bypassed in favor of more immediate tasks.

11. The use of manuals to document cross-border policies, procedures, and contacts was inconsistent across agencies.

xv **Recommendation: Organizations should be provided with the personnel and budgeting support necessary to draft and update cross-border manuals and contact lists.**

Many respondents who regularly interact with cross-border counterparts expressed concern that formal agreements and manuals often create unnecessary bureaucracy. They worried that more formalized arrangements would mandate unneeded meetings, create additional paperwork, and put in place "middle-men" through which they would have to seek information. Two respondents, who valued the freedom and immediacy of information and resource exchange they associated with informal communication, stated:

> Sometimes you can overdo things and in this case you don't need to.

> I think actually maybe there's an advantage to [informal interaction] rather than having things too formalized. There's certainly no red tape involved. You're free to do what you want. The need dictates the agenda.

Even though the interaction may have involved regularized behavior normally associated with formalized structures—such as routine updates and data sharing—many respondents affiliated informal interaction with simplicity and formal interaction with bureaucracy. They were resistant to any measure that would create barriers to direct communication with their foreign counterparts.

Although formalized structures can exacerbate bureaucratic requirements, they can also eliminate bureaucracy and facilitate interaction. Indeed, a representative from the Canadian Red Cross expressed the desire to formulate more formal procedural guidelines with the American Red Cross, particularly in terms of training American Red Cross personnel to assist Canada if a disaster larger than the 1997 flood were to occur north of the border. This representative also viewed formal agreements and manuals as necessary to ensure proper service for foreign evacuees:

> I would like to see us have a more formal agreement between the two societies about how to provide people with the five social services. I mean, [the Red River flood] was no problem and we dealt with it. It wasn't large numbers for one thing, but there may have been a lot of [American] evacuees that didn't access the service because they were turned away and weren't aware that we could have done it for them. It would be nice to have that all a little more formalized.

One Manitoba Hydro employee explained how formal agreements, such as the 1986 Canadian/United States Agreement on Emergency Planning enabled swift Canadian cross-border assistance to Minnkota Power:

> Of course, we didn't have green cards to work south of the border. Special provision was given by both the governor and the senator to allow us free access, so we had no restrictions at the border. And we had no restrictions on our vehicles either with respect to size, which can happen.

This Minnkota Power employee added:

> Due to [the North Dakota Governor and a U.S. Senator's] efforts, the regional office of Immigration and Naturalization Service eased the restrictions to allow Canadian line workers to work on our system repairs (McCutchon & Solarski, 1997: 14).

Likewise, both Canadian and American customs officials described how the 1986 agreement suspended bureaucratically imposed restrictions involved in the movement of resources—such as sandbags and equipment—and people:

American Customs Official:

> There is a provision in the agreement for emergency relief products, and that occurs quite easily....Immigration does not keep track of who is evacuating [the country] or the numbers.

Canadian Customs Official:

> [When Pembina evacuated] their only way out was through Emerson. They were cut off, so you had an entire town of Pembina come up Interstate 29. Again, customs merely waved them through. There was no standard questioning, "When are you going to be leaving Canada?"

Finally, the authority granted by the detailed Emerson/Noyes joint dike agreement allowed the Manitoba Department of Natural Resources crews to carry out the operation of the dike in an informal manner. As this representative explained:

> It's a matter of a phone call. As a courtesy, we call them and say we are going to be making a closure in about four days and they say ok.

In these instances, formalized protocols were in place to expedite the emergency response, not to add another step to the process. Instead, the formalized written arrangements acted as enabling documents.

xvi **Recommendation: Formalized agreements, contracts, and manuals need to provide structure while still allowing for flexibility, adaptive emergency response, and informality. When they do so, formal organizational structures can allow for informal interaction and operations to take place simultaneously.**

Cross-Border Exercises

A formal cross-border exercise was held several years prior to the 1997 disaster; however, the exercise consisted of a hazardous chemical spill scenario and not a flooding or river-related event. Despite the 1997 flooding disaster, government respondents consistently stated that they did not see the need for more frequent exercises or ones that are flood-focused. One respondent attributed this lack of necessity to the region's low population density and the size of its organizations:

> [In] Manitoba, and North Dakota particularly, the state and provincial agencies are rather small and we don't run into the kinds of things you might [encounter] in a large bureaucracy.

Others felt that regular non-crisis contact between cross-border counterparts and the frequency of flooding in the Valley eliminated the need for flood exercises. Highways and customs agencies in both countries frequently coordinate temporary road closures caused by adverse winter storm conditions. Similarly, hydrologists in both countries contact each other throughout the year regarding the many trans-border river systems running through region. The Red River Valley experienced significant flooding in 1996, albeit less severe than the 1997 flood. In some ways, this precursor reinforced transnational relationships and procedures and, as these respondents explained, served as a flooding exercise:

> [The flood of] 1996 acted as a preparation, a scenario....so it was fresh....We kind of got eased into [the 1997 flood].

> If we didn't have [the flood of] 1996 to relate to, and we just got hit with 1997, that would have been pure hell, but because of 1996 we were able to meet with heads up....[Meet with] the farm communities, meeting with the local communities, and reeves.

> If [no flooding] happens for a period of time, ten years of so, then it might be worthwhile [to have an exercise].

The frequency of the cross-border flooding disaster creates the perception among responders that a cross-border exercise is unnecessary and that responding to similar events of lower intensity eliminates the need to practice interaction and response. Many respondents also felt that resources would be better directed towards other activities, such as flood mitigation, or exercises with scenarios focused within the province or state.

xvii **Recommendation: A transnational flood exercise should be conducted if a long lapse occurs between flood events.**

xviii **Recommendation: Exercises are often designed to test stress on the system instead of exercising a breakdown of the system. If smaller floods serve the role of testing the former, cross-border flood exercises should be used to exercise a transnational interaction during a worst-case scenario (for example, a 500 year flood).**

Informal Interaction

In addition to the more formal communication methods—such as boards and planning meetings—a number of informal methods were used during the flood. Instead of relying on written agreements and meetings, respondents who took part in informal interaction tended to use communication channels such as telephone, fax, email, and the Internet.

Those who described their transnational interaction as "informal" stated that the need dictated the frequency, purpose, and method of interaction, not any formal protocol. Two officials elaborated on this need-driven process:

> Nothing is written as far as data transfers as it evolves on need, and we make sure that it works. And if they don't get it, they get on the phone and ask.

> Interaction occurred several times on an as-needed basis. [It was] not routine or on a regular basis.

Cross-border interaction between mayors and other elected officials consisted of informal updates. One American elected official briefly dispensed advice to a Canadian official regarding the evacuation problems that his/her city experienced, and another warned the Canadian counterpart about the severity of the flood. Informal interaction between border communities centered primarily on how the other community was fairing, their evacuation status, and information exchange. As these border community residents recounted, communication persisted after the border crossing closed and continued throughout the evacuation:

> The only way we could communicate with [them] was by telephone 'cause we couldn't get there, you know....I [was] just kind of staying in touch with them and then [they] came over by boat one day and visited us and got caught up to see how we were doing. I stayed in touch with [them] when we were bringing the people [from our community] back.

> At the peak of the flood when Pembina was supposed to have been evacuated, I couldn't reach them at all....So in order to find out what was going on in Pembina, the Coast Guard and myself put on these red wetsuits, survival suits, and took a two-man dingy. We went across the Red Sea here and docked it by the Pembina Bridge and got out. We hitched a ride with a gravel truck down to their command center.

Departments also updated each other informally. For example, United States Customs officials were updated on the resources Manitoba Hydro intended to import into the United States to aid Minnkota Power. The Environmental Protection Agency contacted Manitoba Department of the Environment every two to three days with informal water quality updates. Moreover, a few departments received third-party updates about the other country's response from agencies within their own province or state. Most of the informal interaction involved departments or officials using the telephone to seek or provide answers to emergent questions.

Importance of Informal Relationships

Several agencies involved in the flood response had pre-existing informal relationships with their cross-border counterparts. These relationships developed from formalized organizational structures such as the responders' routine interaction with their counterparts during non-crisis times, their participation on international boards, or visits to the other country's offices and workshops. Residents and elected officials in border communities had ties with their international neighbors due to geographic proximity and regular interaction throughout the year. Interview respondents saw value in the development of informal cross-border relationships. Flood responders who depend on their foreign counterparts for information and data claimed these relationships increased their confidence in the information received:

> I know these people. I've met them. I know them on a personal basis even to some extent. I think that's important that you know who you are talking with, in terms of confidence and so forth.

> It helps if you know people. If you don't know who's at the other end of the line, you don't know their background or experience, you've never met them...it's more difficult to assess the quality of the information.

When responders questioned or disagreed with the information they received, these informal relationships facilitated frank discussion.

12. It is important for organizations to have direct communication with their counterparts. Furthermore, flood responders are less concerned with increasing the frequency of interaction with their counterpart than improving information quality and receiving it in a timely manner.

xix **Recommendation: The presence a Canadian liaison in American flood emergency centers to relay information to Manitoba—an International Joint Commission recommendation—would be beneficial, but only if it is implemented in a way that enhances an organization's direct interaction with counterparts rather than replaces it.**

VI. STANDARDIZATION

Prediction

Although Manitoba relies on several US agencies for precipitation and water run-off data, Canada and the United States calculate their flood forecasts independently, each concentrating on the portion of the Red River Basin that falls within its respective jurisdiction. This operational independence occasionally results in the Manitoba Department of Natural Resources and the National Weather Service generating slightly different predictions for the border communities of Emerson, MB and Pembina, ND; however, hydrologists typically attempt to coordinate their predictions for the international border. Several respondents indicated that forecasters "bend a little" until they come to a prediction agreement. Hydrologists in this region usually do not find it necessary to bend very far, since, according to forecasters, the numbers are usually very close.

When forecasts do vary substantially, hydrologists from Canada and the United States consult each other and discuss problems that may have influenced the data. Ultimately, however, each country must take responsibility for the impact of its prediction on its own jurisdiction. When the Red River threatened Grand Forks in April 1997, the National Weather Service justifiably concentrated much of its efforts on predictions for this city. While they did not update communities further north along the Red River during this period, Manitoba updated their own predictions for Emerson. After much of Grand Forks succumbed to the Red River, the National Weather Service increased its projected forecast for Pembina. Manitoba, after careful consideration of the information provided by the United States, opted to maintain its original prediction for the town of Emerson. Consequently, the Manitoban and the American river-level forecasts differed by several feet during these periods.

Several government agency respondents contended that lay-people do not notice when predictions differ because Canadian and American forecasters do not report predictions in the same measurement units. Contrary to this belief, Emerson and Pembina community residents did compare predictions, were aware of the variations between the two forecasts, and, as this resident commented, even determined that one side's prediction seemed more realistic:

> We kept them [the other border community] in touch with what I heard, with the predictions of the flood, the high water levels, and then I would call [them] and find out what their predictions were. And over the years we have found out that [the other county's] predictions have been a little more accurate, so we just had some good communications there.

Despite residents feeling more confident in another country's forecasting record, community action was based on predictions issued by its own government. The resident continued:

> But when [our agencies] predict something, you have to plan for it and you have to prepare for it...[even] evacuate the town. They said it was going to be that high, and for the welfare of the citizens, [the residents] had to leave town.

13. Hydrologists coordinate their predictions in an effort to publicize consistent water-levels for border communities. Occasionally, however, hydrologists make judgement calls which result in different predictions.

14. Despite differences in measurement units, border communities are aware of prediction discrepancies and sometimes perceive the other country's prediction as more accurate. Any flood preparations are made based on their own country's predictions.

Information Dissemination

The Manitoba Department of Natural Resources and the National Weather Service usually announce their spring forecast outlooks at different times. Respondents involved in calculating and issuing flood forecasts felt each province or state must base the timing of its predictions on its own needs, including the timing of the crest onset within its jurisdiction and the demands from other responding departments in the country. As this respondent stated:

> We have our own needs kinda dictated by what we have been doing for the last five decades....People have come to expect certain products on certain days and I guess they have the same situation [over] there and the two don't mix all that well.

The manner in which hydrologists report the predictions to the public is perhaps the most significant difference between the Canadian and American hydrology systems. While the National Weather Service issues a best estimate prediction and a prediction based on no additional precipitation, Canada reports three predictions: the best estimate as well as the lower and upper deciles. This probabilistic forecasting method includes the 10% likelihood of the best case scenario—based on ideal weather conditions—and the 10% likelihood of the worst case scenario—based on adverse weather conditions. One Canadian official explained how these differences in flood prediction influenced flood preparation measures within each country:

> In our own operations—although we have our best estimate which is based upon median and future weather conditions—we always prepare for our worst estimate...They prepare to defend against the weather [forecaster's] best estimate.

Two Canadian sources noted that while many people perceive the Canadian predictions as more accurate than the American forecasts, the differences primarily lie in the way Canadians report predictions and how the public interprets those numbers.

Measurement Units

Canada and the United States use also different units of measurement. The lack of a standardized measurement system poses potential communication and response challenges for individuals and organizations.

Americans use U.S. customary units of measurement (e.g., feet and gallons), while Canadians use the metric system (e.g., centimeters and liters). However, many Canadians are familiar with imperial measurement, which is similar to the U.S. system. Canadian and American hydrologists calculate their forecasts using their own measurement systems; however, Canadian hydrologists report their forecasts using the imperial system because they claim that river measurements in centimeters, as opposed to inches, are too small for precise flood forecasts, and measurements in meters, instead of feet, are too large (Winnipeg Free Press, 1997). This is somewhat unique when compared with other Canadian organizations. Also, Canada reports river levels according to height above sea level and above winter river level, while the United States reports height above riverbed level. Several flood responders in both countries indicated that the differences in measurement units and reporting do not pose serious consequences for the public. Although one border community resident agreed with these respondents, another resident and another government official thought the opposite was true:

Resident:

> No, no confusion. It might have at first. Water level, what's this? No, I guess being that we are so close to one another.

Resident:

> Our countries use two different figures and it's difficult for us to coordinate. Sometimes it's confusing.

Government Official:

> I don't care who it is. It's too confusing.

Other respondents were well aware of the dangers standardization errors could cause when communicating with their cross-border counterparts. During several interviews, government officials involved in the flood response repeatedly referred to a 1983 airplane emergency in which an error in metric measurement conversion and communication resulted in a

fuel shortage and forced landing of an Air Canada Boeing B-767 aircraft in Gimli, Manitoba. As this official recounted:

> We talk imperial on this flood just to prevent another 757. I don't know if you heard about the plane that landed in Gimli? Took off in Montreal to go to Vancouver and ended up flying into Gimli airport because of lack of fuel and really what happened there is that they thought they were talking in gallons and, you know, they were talking in liters....What we didn't want to happen was another 757 or 767. We couldn't afford to....The American people, I'm sure in the flood you would have heard them talk about flood stages in Grand Forks of 50 feet plus, Winnipeg talked about the Winnipeg St. James Pumping Station of 26 feet plus of being the danger point, the Highways Department talked metric, the Natural Resources people talk cfs's....so one thing [our group of departments said was], "Let's talk the same language here," to prevent [a disaster like the one in Gimli] from happening to us.

Indeed, this heightened awareness of potential dangers associated with measurement conversion encouraged these flood responders to take preventative measures against possible mistakes in unit conversion or communication. Efforts undertaken by departments in charge of highways, representatives from the major carriers, customs, and customs brokers illustrate such measures. For example, the Manitoba Department of Highways and Transportation converted and recorded road elevation and potential water level measurements during the flood's early warning phase instead of waiting to do conversions during the height of the flood when time was of the essence.

Interestingly, Canadians seemed particularly concerned about potential confusion related to standardization and accepted the responsibility of converting units more often than did their American counterparts. Canadians may have more readily shouldered the task of conversion because of their prior experience with the imperial system. Another possible explanation again involves the time and space dimensions of the disaster. Because the flood crest traveled northward, Canadians were generally more dependent on cross-border information and measurements than the Americans. Strategies such as those used by the highways department demonstrate that despite challenges involved in measurement unit conversion, constant awareness of the differences and proper planning can prevent problems during the crisis.

Infrastructure

Canadian and American infrastructure vary and this variation influences cross-border interaction. Canadians invest more resources into permanent diking and elevation projects, while Americans tend to buy out flood damaged property or to rely on temporary and permanent diking measures. Diking differences mostly result in cross-border comparisons with one country citing the failures or successes of the other country's strategies as a measure to grade its own.

Equally important are the differences in the weight allowed on connecting Canadian and American roads. Commercial truck traffic rerouting during the flood required careful coordination. Although a truck carrying a given weight was allowed to travel on a particular Canadian road, it was not necessarily permitted to travel on the connecting U.S. road. In a like manner, some roads in Canada did not allow heavy truck traffic even though connecting American routes did. Through proper planning and communication, highways and customs agencies tried to ensure trucks did not take the wrong route only to find their vehicles could not travel on that road across the border and would have to turn back.

xx **Recommendation: Because poor maintenance or changes in one county's infrastructure can directly impact flooding effects in the neighboring country, it should be the responsibility of organizations in both countries to regularly keep each other well informed. Such changes should be integrated routinely into basin-wide hydrological models.**

Lifeline Services

Flood responders provided equitable property protection within the cross-border dike area. However, another standardization issue—the source of electrical power—led to property damage disparities between Canadian and American households. This flood responder recalled:

> Their power comes from a US utility company....So their basements got wet. Not because of lack of dike protection. Their basements got flooded because there was no power to run their sump-pumps. They got three or four feet of water in their basements. We had power. If they would have been connected to our power source, their basements probably would have been dry too.

Respondents offered conflicting accounts of the cause of electrical power loss to houses in Noyes, Minnesota. Some claimed the electricity was turned off by the utility company, while others attributed the power loss to power line damage. Either way, Minnesotan houses within the Emerson/Noyes dike experienced basement water damage, while in contrast Manitoban houses, which still had power provided to them, did not suffer the same problems.

xxi **Recommendation: Measures should be in place to help prevent flooding of all buildings within the joint dike when one side's electrical power shuts down.**

When Manitoba Hydro workers traveled south to assist Minnkota Power after the April ice storm, Manitoba requested that the American power company identify any special procedures the Canadian workers needed to be aware of when fixing downed power lines. However, respondents from both utility companies explained that line repair is a relatively standardized task. As a result of the cross-border transferability of line repair skills, the need for quick power restoration, and Manitoba Hydro's experience, the Americans granted Manitoban crews considerable autonomy in the projects on which they worked. As one Manitoba Hydro worker explained:

> We told them, of course, that it was our preference that we work under our own safety rules, for example in our own work methods, and they were aware of them already. Their line configurations, and etc. were very similar to what we have. We had a contact to work with from Minnkota Power and....it was interesting. Although they had a contact for us to work with, when we got there basically they gave a geographic area to work within, and, we looked after our own project....[On one project] they wanted us to coordinate all the repair including patrolling their workers and those contractors that they hired locally. So that was kind of interesting. They actually placed us in charge of the whole project.

Even though standardization inconsistencies were minimal enough to allow Manitoba crews to take charge of their own projects and supervise American contractors, a guide was provided to the foreign crew as an added preventative measure against standardization problems and difficulties in obtaining supplies or information within the American organization.

15. Many technical skills are transferable across the international border.

xxii **Recommendation: Private and public sector organizations should discuss ways their skills might be transferable across the border in an emergency situation and seek out opportunities where mutual aid is beneficial and appropriate. When cross-border assistance does occur, guides should be provided to the international teams to facilitated requests and help with standardization problems that may arise.**

Language

Manitoba, North Dakota, and Minnesota are all English speaking jurisdictions, so language did not present serious obstacles for interaction. However, a respondent from one of the utility companies observed terminology differences between Manitoban and American workers:

> You hated saying, you know, "What's that?" and sound stupid. You just had to listen.

For Manitoba Hydro and Minnkota Power, these terminology differences were minor and created no reported complications; however, if workers are hesitant to question their transnational counterparts in fear they will appear unknowledgeable, the potential for misunderstandings exists. In the case of the Red River flood, comparing differences in idioms actually served as a communication bridge and facilitated informal dialogue. This American electricity worker described how learning Canadian slang facilitated informal bonding between cross-border workers:

> The most interesting thing was, you know, when you're in the line business there's a lot of slang for hardware, for people, for situations, and I think the thing that the funniest was comparing the Manitoba Hydro slang to the American's slang...One of my foremen who worked with the Canadians, he said "You know what a booter is?" and I said "No." He said "You know when you have a pair of overshoes that go up to your knees and you step in water that's just a little bit higher? That's a booter"....Everything cut and said, it was an interesting period. I met some great guys.

16. Informal dialogue about culturally-based word choice led to discussions about each other's province or state, which in turn led to conversations about each other's family and interests and resulted in social bonding. However, personnel participating in transnational assistance may be hesitant to question terminology with which they are unfamiliar.

xxiii **Recommendation: Organizations who anticipate that cross-border assistance may become necessary in the future should meet before an emergency strikes to discuss areas where standardization differences may prove problematic. This information should then be disseminated to operational personnel. Before cross-border personnel are sent to assist, they should be instructed to ask questions whenever directives or terminology seems unclear.**

Laws and Regulations

Differences in laws and regulations can create difficulties when emergency responders are employed for cross-border assistance. When the requesting country pays trans-border personnel for their help regulation inconsistencies, if not dealt with before the disaster strikes, can hinder a speedy response and place the responding agency at legal or financial risk. A Manitoba Hydro respondent explained:

> One law that is applicable to us even in emergency conditions [although] they set it aside for this situation, is that any companies that deal in the States, commercially, based on their size, commercial activity would cause you to have a drug and alcohol test within your company. And if you don't, and you participate in commercial business south of the border, you can be fined something up to $10,000 per incident....Our lawyers are actually looking at that, to what extent you have to have a program. Does it have to cover all the employees in the company or can it be specific to those that would go across? And if that's the case, can it just be enacted prior to them leaving? Test everybody and let them go. That would be our preference. There's all kinds of issues that it creates, human rights issues and that.

Although crews assisting the Americans did not experience such constraints, the utility company became aware that U.S. regulations may require Hydro employees to be subjected to drug testing if they assist Minnkota in future emergencies.

xxiv **Recommendation: Organizations should investigate if foreign laws or regulations impact their ability to assist the other country during an emergency situation.**

Wages and Salaries

One might expect that salary discrepancy between American and Canadian personnel who work together could raise discontent among them. Such was not the case during the Red River flood when Manitoba Hydro workers assisted Minnkota Power. In fact, one respondent suggested that although it typically does not take long for people to begin comparing pay, such discussions occur less frequently between local workers and workers from another country than if the assistance came from a neighboring state or province. He further explained that differences in exchange rates, taxation, and medical coverage render Canadian and American salaries virtually incomparable. The emergency nature of the situation also detracts from salary discrepancies. Workers are both appreciative of the cross-border assistance and too focused on the emergency response to contest pay differences.

Responsibility

Cross-border standardization becomes an important consideration when similar or affiliated agencies perform different roles in their respective countries. For example, the American and the Canadian Red Cross have divergent responsibilities. In the United States, Congress mandates that the Red Cross act as the primary response agency in the provision of emergency social services including food, shelter, clothing, registration and inquiry. In contrast, Canadian emergency social services falls under the municipality's responsibility, with additional support provided by provincial agencies in multi-municipality events. Accordingly, the Canadian Red Cross's primary disaster roles are registering the evacuees, reuniting them with other evacuees, and providing information to friends or relatives inquiring from outside the disaster area. This difference in agency responsibility delayed assistance for some Americans who evacuated north of the border. One respondent explained that some American evacuees were initially denied service at Canadian municipal reception centers:

> [The American evacuees] came to a reception center in Canada and were denied service because they weren't Canadians and the municipalities weren't prepared to pay for them. So in a sense, they became refugees, and so certainly the [Canadian] Red Cross was there to help them...when they were identified to us.

The Canadian Red Cross did not establish similar reception centers because it is not within their mandate to provide this service to Manitoban residents. Once American evacuees were identified to the Canadian Red Cross, the agency provided them with full emergency social services. Because only a few Americans sought assistance, the Canadian Red Cross was able to accommodate the foreign evacuees. This same respondent wondered if the difference in agency responsibility prevented some evacuees from getting the help that they needed:

> There may have been a lot of evacuees that didn't access [the Canadian Red Cross] because they were turned away [by municipalities] and weren't aware that we could have done it for them. It would have been nice to have that all a little more formalized.

The Canadian Red Cross only provided emergency social services for approximately ten American households. Had a greater number of North Dakotan and Minnesotan residents fled to the province and sought assistance, the provision of services may have proved more complicated.

17. Disaster victims evacuating to a neighboring country do not always know from which organizations they should seek assistance or information from because the responsibilities of similar organizations may differ from those in their own country.

xxv **Recommendation: Manitoba, North Dakota, and Minnesota should have strategic plans in place to cope with a mass influx of evacuees during an**

emergency. Accordingly, American residents evacuating to Canada and Canadians evacuating to the United States should be given information packets as they cross the border, outlining where they should seek assistance and information.

In 1992 following Hurricane Andrew and Hurricane Iniki, the Canadian Red Cross sent teams to the United States to assist with disaster relief efforts. After this experience, the Canadian agency established procedures and designated staff to provide extra training and assistance to its personnel assisting the American Red Cross. Perhaps because Canada has yet to request assistance from the American Red Cross, that same training is not in place for Americans to assist north of their border. One respondent suggested that although assistance from the American Red Cross was not needed in Manitoba during the 1997 flood, both countries should work together to put in place training and procedures that would facilitate the smooth integration of American personnel into a Canadian relief effort:

> You know, we don't have large scale disasters all that often...and [the 1997 flood] was probably the closest we've ever come to almost needing that, but I think if we were to look at the earthquake threat on the west coast, there's no question it would be sort of a cross-border scenario. I think that's one of the things we need to consider...because that's going to be a huge scale.

xxvi **Recommendation: In an effort to prepare for future disasters, the American Red Cross should put in place procedures that provide for training volunteers who are asked to assist the Canadian Red Cross.**

Organizational Structure

In the United States, the organizational structure of flood response efforts are more fragmented and responsibilities are more widely dispersed across departments than in Canada. The United States also involves a greater number of federal agencies for responsibilities handled in Manitoba by provincial departments. For example, activities under the auspices of the Manitoba Department of Natural Resources fall under the responsibility of numerous agencies in North Dakota—such as the North Dakota State Water Commission, the North Dakota Department of Game and Fisheries—and also require the involvement of federal agencies including the National Weather Service, the Army Corps of Engineers, the United States Geological Survey. Although Canadian federal organizations were involved in the some of the data collection and flood response, it was primarily Manitoba Department of Natural Resources who was interacting with these American agencies. Differences, however, in organizational structure did not pose problems for respondents during the 1997 flood because these agencies regularly interact during non-crisis times.

The ownership of Canadian and American electric power companies that interacted during the flood response also differs. Unlike Minnkota Power, which is a cooperative and one of

several electricity providers in the area, Manitoba Hydro is a corporation that is owned and operated by the provincial government. Manitoba Hydro manages the provincial power supply throughout Manitoba. As a result of this difference in ownership type, repair priorities were different in the United States than they would have been for Manitoba Hydro in their own province:

> What was a big difference when we got there was [that the Americans are] made up of a number of cooperatives [and] utilities. They'll have a transmission utility, a distribution utility, and there might be three or four utilities who own a station, own a sub-station, you know, which we found very awkward....I guess the way we would approach it [differently] 'cause we own everything in this province, we would be putting everything back together while we were there, but our guys found it pretty hard to understand why we were just going by putting the transmission line up meanwhile there was a farmer here, a mile of line down, and he'll never be back on for weeks. And it's because it's a different company...So we were working for Minnkota and we worked on their [power lines] and that's all. So that's a significant difference.

Organizational differences in repair preferences did not complicate efforts as projects were clearly outlined to the Canadian response crews. Because Minnkota Power was the requesting organization, not other American utility companies, Manitoba Hydro workers took their directions from Minnkota Power.

Research by Winslow (196) and Toulmin, Givans, and Steel (1989) suggest that inconsistencies in terminology, procedures, and technology can hind emergency response. An important finding from this study is that the problems caused by their standardization inconsistencies between Canada and the United States were minor or non-existent. One reason the differences between the two countries did not impede coordination was that although the scope and magnitude of the disaster was large, it did not overwhelm the capabilities of some agencies to ameliorate challenges cause by transnational differences. Furthermore, these organizations work together during both non-crisis periods and routine emergencies. They therefore are already familiar with many standardization issues and had already addressed their potential threat to response efforts.

18. Differences in procedure or timing of activities often stemmed from differences in each state or province's particular needs. Moreover, sometimes standardization is ideal but not possible.

xxvii **Recommendation: Transnational standardization of timing and procedures should not be insisted upon for the sole purpose of standardization. Each county chooses its methods based on its own political, cultural, organizational, and jurisdictional needs. Instead, organizations should learn**

from the success or failures of their counterparts, evaluate methods used in each country, and incorporate or adopt similar practices where appropriate.

xxviii **Recommendation: Standardization inconsistencies do not necessarily need to lead to problems in disaster response if: 1) the individuals or organizations involved are aware of the inconsistencies; 2) they are also aware of the potential consequences those inconsistencies may cause within and outside of the respective organization; and 3) they take adequate steps before the disaster to prevent problems in their response.**

VII. CENTRALIZATION OF INTERACTION

Centralization of Provincial/State Interaction

In order to examine the degree of centralized interaction between Canada and the United States, it is first necessary to determine the degree of centralization within each country. Both Canada and the United States rely on multi-agency emergency response coordination and use decentralized emergency response. For instance, the Manitoba Department of Highways and Transportation does not need to seek approval from the Manitoba Emergency Management Organization or Emergency Preparedness Canada for emergency related decisions. In each province and state, organizations did, however, coordinate their activities with other departments through a central coordination location—the emergency operations center (EOC). The EOC did not make decisions for departments; instead, departments made their own decisions, sometimes in consultation with others at the EOC, and their representatives coordinated these activities with other departments in the EOC. The provincial and state emergency management agencies did not hold supervisory positions over other departments, but instead supported the provincial or state response through their participation in the EOCs. Response implementation decisions were decentralized and made within the responsible department or agency, although information was to some extent centralized as the EOC acted as a central core of the star (see Figure 3). The points on the star in Figure 3 represent departments and agencies. Information radiated inward to the core from departments through their EOC representatives, while information about other departments and the overall response effort radiated back outward to department through the same channels.

Hightower and Coutu (1996) state that the central organization in a star network has an advantage over other organizations in the system. All information flows through the core, and as the system becomes centralized, the core organization begins to make decisions for the other departments. During the 1997 flood, the star network of information functioned differently than Hightower and Coutu describe because the EOC was at the core of the star, not an independent organization. Decision makers in the EOC consisted of the upper-level decision makers within individual departments. The purpose of the EOC was to increase the flow of information to organizations, not limit direct interaction and information exchange between individual departments. Agencies that did not have EOC representation, however, did not have equal access to EOC information. Space in the EOC was limited only to those provincial and state government officials saw as essential to the function of their respective EOCs. Organizations not allowed EOC access relied on their contacts within organizations that did have EOC representation.

Centralization of Transnational Interaction

Overall, the cross-border interaction between emergency response systems was decentralized. Each Canadian department often sought flood-related information from multiple American organizations because: 1) of the multiple dimensions of the flood response; 2) two states and two American federal regions were impacted; and 3) American organizational responsibilities differed from those of Canadian organizations. Three respondents further explained this variation in organizational responsibility:

> [Unlike the Americans], we don't have a forecast office and a service office. We have one-stop-shopping, so to speak.
>
> The National Weather Service is a much bigger organization. Ten people in Chanhassen, plus sub-service offices....and in Manitoba, just [one person].
>
> [North Dakota] doesn't have a Department of Natural Resources. We're broke[n] up into little pieces.

Interaction between Emergency Preparedness Canada (EPC), FEMA, and state and provincial emergency management organizations occurred primarily on an executive, as opposed to a more operational, level. Their interaction usually consisted of the Americans providing informal updates about the severity of the flood flowing north. Elected officials from higher levels of government also interacted with their foreign counterparts for the purpose of receiving flood updates. On two or three occasions, EPC received updates from FEMA. The Premier of Manitoba spoke with an American Governor and was warned to "believe what you hear." Town and city mayors interacted with their counterparts more than elected officials from higher governmental levels, and their interaction sometimes involved offers of sandbags and lodging for evacuees.

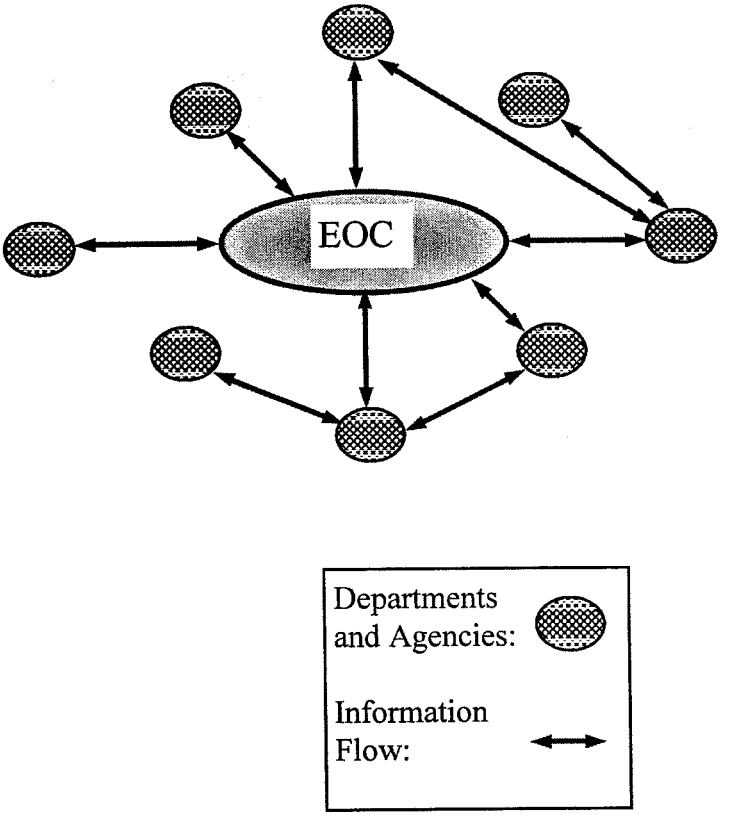


Figure 3: Centralization of Information-Based Interaction

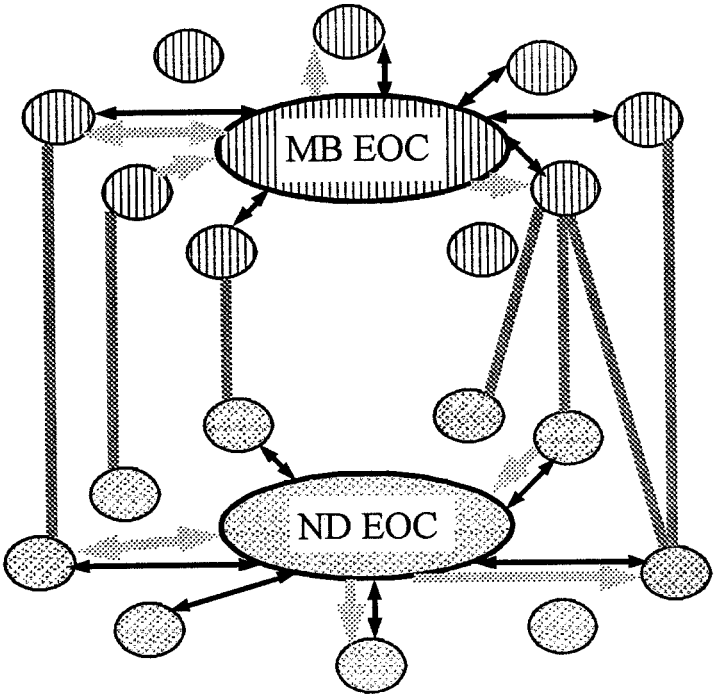
In contrast to interaction between high level elected officials and emergency management agencies, which consisted primarily of informal updates about the flood's severity, organizations with operational roles in the flood response interacted more frequently and made more decisions based on this interaction. Departments involved in activities such as flood forecasting, highways, customs, the environment, and natural resources coordinated cross-border activities and shared information that was used in flood-response decision-making. In some cases interaction took place between people holding executive level positions within the organization, other times it was between people who took a more active role in warning and response activities.

Research by Scanlon (1994) shows that the absence of an emergency operations center during a disaster hinders effective coordination among agencies. During the Red River flood, each state and provincial jurisdiction activated an emergency operations center. Many municipal jurisdictions also activated their own EOCs. Manitoba, North Dakota, Minnesota did not activate a joint EOC. While a transnational EOC is possible in a geographically isolated emergency—such as a train derailment or chemical spill— it was neither possible nor appropriate for a disaster long in duration and large in scope and magnitude. In fact, a joint EOC would likely have drained resources from each jurisdiction. Organizations instead relied on their counterparts in the neighboring country for effective cross-border interaction and looked to the EOC and other agencies within their own nation for information about other transnational activities.

Ideally, information should have radiated from the agencies—the star points—to the EOC—the star core—and then radiated back out to the agencies. In practice, however, information about transnational interaction did not always flow back to the EOC and to other departments.

Figure 4 illustrates the interaction between the Manitoban and North Dakotan emergency response systems, including: resource sharing; response implementation; and the exchange of information leading to specific response implementation. Interaction between Manitoban and Minnesotan systems was consistent with Figure 4. The interaction described in this figure does not include informal updates that did not lead to response decisions.

The illustration shows that cross-border interaction occurred between decentralized departments and not between the emergency operations centers. At times the EOC representative was also his or her department's representative cross-border; however, this cross-border interaction was a consequence of that individual's role within the department. In other situations, the person involved in transnational interaction was not an EOC representative. Provincial/state EOCs concentrated on response efforts within their own jurisdictions.



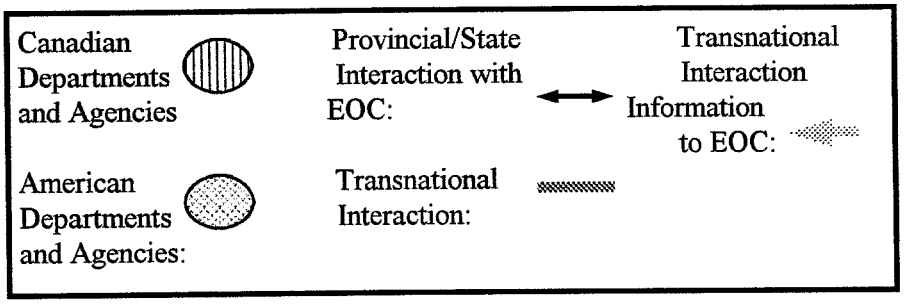


Figure 4: Centralization of Interaction Between Manitoba and North Dakota

Similar to Figure 3, the core of each interaction star in Figure 4 represents the EOC. The circles on the star's periphery signify the departments and agencies involved in the flood response. Manitoban and American organizations with representation in their respective EOCs are connected to the EOC—the star core—with thin black arrows. Other organizations involved in the response but without EOC representation do not have lines connecting them to the EOC. The thin black arrows are indicative of information radiating into the EOC and out to the organizations. Thick dark-grey lines show the transnational interaction between organization. As we can see from the thick light-grey arrows, only sometimes does information about transnational interaction radiate from departments to the EOC. While most organizations stated that they were aware of cross-border interaction between departments involved in flood forecasting, many overestimated or underestimated the amount of cross-border interaction between departments involved in other flood-response activities—although the departments they lacked knowledge about varied.

Some respondents stated that the Red Cross, elected federal officials, EPC, FEMA, and the military had significant cross-border interaction with their respective counterparts; however, respondents from these organizations said their cross-border interaction during the flood's warning and response phases was minimal or non-existent. Other respondents underestimated the interaction between highways-related departments and electric companies. Finally, several departments in both countries were not aware of the existence of a joint Canadian/American dike.

Problems generated by this lack of knowledge were not evident during the 1997 flood; however, organizations who do not interact transnationally might be able to use information gathered by those who do. It is also possible that inappropriate decisions could be made based on incorrect assumptions about the degree of cross-border interaction by other agencies.

19. The decentralized system of cross-border interaction used during the flood worked well, however, information about cross-border interaction between decentralized agencies did not always back to the Emergency Operations Center or to other departments. This resulted in some respondents overestimating or underestimating the amount of transnational interaction other departments had experienced.

xxix **Recommendation: The decentralized system of cross-border interaction should be maintained, however, organizations should be better aware of transnational interaction undertaken by other department. Organizations who interact with cross-border counterparts should disseminate more information about this interaction to the Emergency Operations Center and to other agencies. To avoid both unnecessary bureaucracy and arbitrary decision-making about the importance of information, governmental and non-governmental organizations in each country should meet to outline what kinds of information about cross-border activity they would find helpful in fulfilling their emergency response roles.**

VIII. CONCLUSIONS

Overall, Canadian and American organizations viewed their experiences with trans-national coordination during the 1997 Red River flood as successful, reporting that their counterparts made an added effort to offer and provide information and assistance during the emergency. Most cross-border interaction took place between organizations who interact throughout the year and, therefore, their patterns of interaction were well established before the 1997 flood. From this finding, we can infer that fostering cooperation during routine periods will have a direct effect on coordination during a disaster. Similarly, creating new dependencies through joint initiatives and flood control structures impacts cross-border dependencies in times of crisis.

Organizations do not necessarily require more interaction but instead need information and assistance that is timely and comprehensive. This is especially true as jurisdictions pass through the warning phase to the response phases of the emergency. Many flood responders feared that stringent, formalized procedures would create problematic bureaucracy; however, most also acknowledged the benefits of formal agreements that act as enabling documents and provide structure while still allowing for flexibility. Respondents valued the trust and adaptability that accompanied informal and direct interaction. Formalized agreements, boards, and initiatives should be pursued as worthwhile opportunities for both the provision of organizational structure and the development of informal relationships, however, these measures should be goal-directed, allow for flexibility, and not unduly impede on participants' time and resources. New technologies can greatly enhance the effectiveness of transnational interaction between Canada and the United States during an emergency and complement direct communication between counterparts. Organizations should be given adequate training and support to integrate these technological advances into their operations.

Regardless of the type of disaster threat, the continuity of cross-border commercial traffic is crucial to the regional economy. Further study is needed to identify safe and effective ways to maintain this flow of traffic. Integrating highway closure and threat information into shared electronic data bases is one example of how new technologies could facilitate this goal. Although some organizations provided material or personnel to their counterparts, the majority of the transnational interaction consisted of information exchange. While organizations benefitted from flood-related discussions with their counterparts and sometime consulted with them in the decision-making process, representatives from these same organizations also stressed the importance of being able to make autonomous decisions based on their own country's needs. It is important to remember that the responsibilities of organizations lies first within their jurisdictions. Although organizations are typically willing to provide cross-border assistance, this occurs only after their responsibilities at home are met. In some cases, transnational assistance was seen as an expeditious alternative to relying on help from sister provinces or states. At other times, due to the nature and flow-direction of the flood event, cross-border communication was absolutely necessary for a satisfactory emergency response. Organizations who do not yet have mutual aid agreements with their Canadian or American counterparts should explore whether or not such arrangements could prove mutually beneficial and develop these protocol before a disaster strikes.

Not all cross-border coordination, however, is ideal or feasible. Careful consideration of unanticipated consequences is needed before expanding coordination.

Canadian and American organizations must be vigilant in contending with standardization inconsistencies that could prove problematic to effective cross-border interaction. If organizations are aware of both the differences between jurisdictions and their potential consequences, and if they take adequate steps to prevent problems before the disaster strikes, these inconsistencies do not necessarily need to lead to problems in disaster response.

The decentralized system of cross-border interaction used during the 1997 flood worked well and should be maintained in future. Greater steps should be taken, however, to disseminate information about each organization's interaction back to other organizations both with and without EOC representation. To avoid unnecessary bureaucracy and arbitrary decision-making about the importance of information, governmental and non-governmental organizations in each county should meet to outline what kinds of information about cross-border activity they would find helpful in fulfilling their emergency response roles.

Canadian and American organizations have made great strides in fostering coordination and communication during flood emergencies and there is a general willingness on the part of organizations to continue to do so. Organizations are compelled to interact cross-border by their mutual dependence and sense of social affinity. Organizations with existing transnational relationships should be given the appropriate resources to improve the quality of their interaction while agencies with few ties to their cross-border counterparts should be encourage to explore whether or not such new relationships might prove advantageous.

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