

**AN ASSESSMENT OF RECOVERY ASSISTANCE
PROVIDED AFTER
THE 1997 FLOODS IN THE RED RIVER BASIN:
IMPACTS ON BASIN-WIDE RESILIENCE**

submitted to the

**International Red River Basin Task Force
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by the

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PREFACE

In June 1997, the governments of the United States and Canada asked the International Joint Commission (IJC) to analyze the causes and effects of the devastating floods on the Red River of the North that occurred in the spring of that year. In response to this request, the IJC appointed an International Red River Basin Task Force (RRBTF) in September 1997 and charged the group with making recommendations on how to reduce the impact of future floods. In December 1997, the RRBTF issued an Interim Report that contained numerous conclusions and recommendations, the first of which was that "Flood preparedness must be a part of the culture of the Red River Valley." The Task Force subsequently recognized the importance of recovery assistance in contributing to this "cultural" paradigm, and among other actions, commissioned a study to assess the strengths and weaknesses of the recovery assistance programs in the two countries. The task force approached the Natural Hazards Research and Applications Information Center (NHC) of the University of Colorado at Boulder, and requested that a proposal be submitted to undertake this study.

The NHC, in collaboration with colleagues at Environment Canada, prepared a proposal that subsequently was funded by the RRBTF. Environment Canada later subcontracted its portion of the study to scholars at the University of Manitoba's Disaster Research Institute (DRI). Details about the specific activities undertaken by the research teams in conjunction with this study are found in Appendix B.

EXECUTIVE SUMMARY

Ideally, the recovery period after a major flood is a time to focus attention on enhancing flood resilience—a community's ability to 'bounce back' quickly after a flood without permanent, intolerable damage, or disruption, and without large amounts of outside assistance. This study examined the extent to which recovery assistance provided by Canada and the United States to selected localities after the 1997 floods on the Red River of the North did or did not actually contribute to one category of flood resilience—that of structures (residences, commercial/business buildings, public facilities, and infrastructure such as roads, bridges, and treatment plants).

The project team analyzed the many kinds of recovery assistance that were provided in light of criteria deemed to contribute to resilience: reduction in numbers of buildings or structures in the floodplain; increased protection for buildings that do remain at risk; speeding recovery in a future flood; promoting self-sufficiency and responsibility in individuals and communities; promoting flood insurance; enhancing community livelihood, environmental quality, or quality of life; supplementing flood-free building stock; and providing for mitigation..

The study found that, in both countries, some forms of assistance did contribute somewhat to providing an increased level of protection for at least some structures; helped increase the local stock of flood-free buildings to some extent; and helped build local self-sufficiency in some ways. For other types of assistance, the impacts varied. In the United States, recovery assistance was used to permanently remove hundreds of structures from floodplains; to encourage the purchase of flood insurance; and to fund some mitigation measures. In Canada, removal of structures and the promotion of repairs that would reduce future damage did not occur programmatically. In Canada, there were problems in delivering recovery assistance, at least initially, while the U.S. effort was fairly well coordinated. In neither country did recovery assistance strongly foster individual responsibility or self-sufficiency, or taking steps to prepare for a future flood that may exceed the design levels of the structural flood control works. In fact, the sense of safety generated by structural flood protection (levees, dikes, and floodwalls) in both countries may work against the long-term resilience of the residents.

The project team concluded that there was more opportunity for using recovery assistance to foster flood resiliency in the Red River Basin than was used after the 1997 floods. For example, more assistance to permanently remove structures from flood hazards areas would improve resilience. Conditions requiring the purchase of flood insurance or the adoption of mitigation measures could be more widely attached to recovery assistance. Information about resilient recovery techniques could be shared across the border. Recovery assistance provided by nongovernmental entities could more fully embrace the tenets of resilience. The relationship between the levels of acceptable flood risk on both sides of the border should be weighed again, with an eye toward resilience.

It is important to note that this study is not an evaluation of any one program, nor is it a commentary on any agency's policies or practices. Rather, it is a simple way of examining, in general, the extent to which various streams of assistance for structures did or did not help reduce future flood damage to buildings and other structures or enhance other aspects of resilience in the Basin.

Additional recommendations are made for enhancing resilience in the Red River Basin, along with some ideas for further investigation. A key subject for future research is the impact of recovery assistance on other aspects of resilience, since the narrow focus of this study is but one influence on the long-term flood resilience of communities.

I. INTRODUCTION

The Role of Recovery Assistance in Flood Mitigation and Social Resilience

From the first suggestion that the spring flood of 1997 in the Red River Valley was likely to be an extraordinary event until the moment when the flood waters crested, the focus of attention was on fighting the flood waters and taking steps to protect people and property to the maximum extent possible.

As the magnitude of the disaster became manifest, first in North Dakota and Minnesota and then in Manitoba, attention shifted to the process of recovery. The first desire of people whose property has been flooded and whose lives have been at risk is to see things returned to normal as fast as possible. For many this is simply getting back as close as possible to the situation before the disaster. This means putting their place of residence, their family, their social involvement, and their economic livelihood back as they were before. More serious reflection reveals that this is rarely if ever possible, and that recovery from disaster inevitably involves adaptation to new circumstances, both in the community and in private lives.

Emergency management and disaster relief organizations recognize that actions taken in the short term to respond to suffering and hardship, and actions taken to help restore the status quo can have long-term effects with different outcomes. That is, they can make both individual households and whole communities more resilient and better able to cope with and recover from future events of a similar kind. Alternatively, they can help to recreate situations of similar or greater vulnerability by supporting and facilitating inappropriate and often short-sighted actions. In most situations a mixture of these two divergent consequences occurs. The rise in losses due to disasters in both Canada and the United States suggests that the recurrence of extreme events is often associated with a net increase in property and personal loss in spite of the well-intentioned efforts at recovery and reconstruction that have gone before.

Even though this understanding is widely shared among government agencies and volunteer non-governmental groups, and even among the disaster victims themselves, putting into practice a recovery assistance program that will reduce longer-term vulnerability while simultaneously providing quick relief from the disaster impacts has proved to be extraordinarily difficult. Recognition of this fact led the International Red River Basin Task Force to call for a study to assess the impact of recovery assistance on the long-term resilience of the Red River Basin after the 1997 floods in Canada and the United States.

Study Objectives

To study this issue the Project Team addressed both disaster mitigation and long run social resilience. Mitigation refers to those practical steps that can be taken to reduce vulnerability to future events. This includes, for example, removing buildings from flood hazard areas or increasing the level of protection through actions such as elevating buildings, floodproofing, construction of levees and dikes, and providing publicly sponsored insurance. Beyond those well-defined mitigation measures lies a wider array of possible actions that can help to strengthen the resilience of individuals, communities, and states and provinces.

Resilience, like sustainable development, is a much broader concept than "disaster mitigation" and is much harder to define in an operational manner. Since the concept is so broad and so many factors enter into successful resilience, it was decided at the outset that the study would focus on a limited component of resilience and disaster mitigation, namely that of structures.

This report addresses the extent to which the vulnerability of the structures (used here to mean buildings of all sorts, including residences, public facilities, commercial buildings, and major infrastructure such as roads, bridges, and treatment plants) in the Red River Valley has changed as a result of the recovery assistance that was provided in the wake of the 1997 flood. In other words, could the citizens of the Basin and their collective organizations of government and civil society cope

better with another flood of similar or even greater magnitude? Would the losses to structures be greater or less? Has the ability of the region to bounce back—its resilience—been increased or decreased?

In limiting this analysis to structures only the Project Team was acutely conscious of having omitted many important elements of disaster mitigation and social resilience. For example, the large number of social concerns that press populations in the wake of a flood, such as mental health, lost or interrupted employment, or diminution in the quality of life are not addressed. Pervasive economic issues of local business failures, the tax base, and planning and implementing redevelopment are touched on only briefly.

The basin of the Red River of the North is bisected by a political boundary. Issues of drainage, environmental quality, flood vulnerability, and others are shared by both Canada and the United States and, in fact, there is much to be gained by a common approach to addressing these watershed-related matters. This study took a bilateral approach in the hope that recovery assistance programs in both countries could be compared to identify the strengths and weaknesses of each and to ascertain lessons that can be transferred in either direction across the border.

Description of Report Contents

The remaining sections of this report present the results of the study described above. First there is a description of the study method, including the limitations of the work. Sections III and IV review the flood and its impacts in the study areas and present a more detailed description of the recovery assistance provided for in the wake of the floods in both Canada and the United States. Section V gives the Project Team's analysis of how the recovery assistance that was received for damaged structures contributes or does not contribute to the Red River Basin's long-term flood resilience. Section VI compares the various recovery programs of Canada and the United States and offers conclusions and recommendations to policymakers and others for improving assistance programs, with an eye towards using those programs to foster flood resilience. Further, it identifies key questions about resilience that remain unanswered and that the Project Team deems worthy of future investigation. Appendixes include a list of published documents about the 1997 Red River floods (Appendix A); details about the Project Team's activities, including a chronology of tasks and activities (Appendix B); organizations and persons contacted (Appendix C); and the questionnaire used to conduct the interviews (Appendix D).

II. METHOD

Phases of the Study

The study progressed in three stages: characterizing the recovery assistance provided after the 1997 floods; determining the effect of that assistance on flood resilience within the Basin; and analyzing recovery policies and programs in Canada and the United States to make comparisons, identify strengths and weaknesses, and make recommendations for improvements and research.

Characterize Assistance Provided

The first task of this study was to simply characterize the recovery assistance programs provided to all pertinent groups including individuals, businesses, and government entities (e.g., cities, rural municipalities (RMs), school districts, counties), within the limitations described below. This characterization consists of a summary of the types and extent of both financial and technical assistance provided to assist in recovery from the flood: who provided it; who received it; what form it took; what conditions (if any) were imposed on receipt of the assistance; what its purpose was; and (where available) the purpose for which it was actually used.

The Project Team used two techniques to do this. First, they collected and synthesized existing post-disaster reports and reconnaissance studies available from federal, state, provincial, local, and non-governmental organizations. Documents were identified and collected by searching the World Wide Web, conducting library searches, and by utilizing new and existing contacts with public and private agencies. In addition to published documents, the Project Team was also able to obtain a number of informal, often internal, reports, memos, and spreadsheets.

To supplement the information that was obtained via published and unpublished documents, semi-structured interviews were conducted over the telephone and in person with representatives of all pertinent federal, state, and provincial agencies; local governments; and private sector groups. In this way the team obtained additional information about the procedures used to distribute the recovery assistance, implement the various programs, administer the funds, track progress, and other steps in the process. The results of this characterization are presented in Sections III and IV, below.

Determine Effect of Assistance on Flood Resilience

Once it established a thorough characterization of the recovery assistance obtained in the Red River Basin, the Project Team's goal was to review the various types of assistance provided and determine how effective each was in promoting future flood-resilient communities in the Basin. Because of the limited time and resources available for this study, the Project Team confined itself to examining only one component of local flood resilience, namely, the flood resilience of structures.

The ultimate question for this category of flood resilience (and one that was not fully answered by this project) was to determine if the number of at-risk structures was minimized, and to what extent, as a result of the recovery assistance provided. Thus, after developing a characterization of the recovery assistance that was received on behalf of different types of structures within the Basin, the Project Team set out to analyze whether that assistance had the result of making that type of structure more resilient with regard to future floods. The results of this analysis are presented in Section V.

Comparisons, Themes, and Recommendations

All these data—background information, characterization of recovery assistance, and determination of impact on flood resilience—were then analyzed by the Project Team. The team drew conclusions and made recommendations about the impacts of the recovery assistance in both countries and developed basin-wide or jurisdiction-specific recommendations for improving flood recovery

assistance and for working towards the long-term goal of promoting flood-resilient communities in the Basin. Further, the team identified several areas of needed study to address questions that remain.

Limitations of the Study

Due to limited time and resources, the study was limited in the United States to the two hardest-hit communities: Grand Forks, North Dakota, and East Grand Forks, Minnesota. In Canada, the study focused on selected areas of Manitoba affected by the flood: the Rural Municipality (RM) of Ritchot (including the communities of St. Agathe and Grand Pointe), and the St. Norbert area within Winnipeg.

The limited time frame was another reason the Project Team focused its investigation on the resilience of structures. Although some information was obtained and analyzed on other important recovery and resilience issues (particularly in Canada), the Project Team attempted a comprehensive treatment only of structures.

III. RECOVERY ASSISTANCE IN GRAND FORKS AND EAST GRAND FORKS

Impacts of the 1997 Flood

In April 1997, the cities of Grand Forks, North Dakota, and East Grand Forks, Minnesota, experienced one of the most devastating floods in their history on the heels of a long and severe winter that featured eight blizzards and record-breaking snowfall.

On April 4, 1997, the Red River of the North exceeded the flood stage of 28 feet. Over the next several days, flood waters continued to rise and by the middle of the month, levees began to fail or overtop, resulting in orders to evacuate both cities. By the time the Red River finally crested at 54.11 feet on April 21, 1997, 90% of Grand Forks' 52,500 citizens and virtually all of the 9,000 residents of East Grand Forks had evacuated.

In addition to overbank flow of the Red River itself, flooding occurred on the Red's tributaries: the Red Lake River on the east side and the English Coulee on the west side. Overflowing storm sewers also contributed to the inundation. Seventy-five percent of Grand Forks homes (approximately 7,800) and all but 27 of the 2,300 homes in East Grand Forks were flooded with polluted waters.

Both the cities' downtown business districts were heavily impacted by the floods. As an example, 100% of the 315 firms in downtown Grand Forks, employing nearly 3,800 workers, were flooded. The worst damage was suffered by 11 commercial buildings that were destroyed by fire during the peak of the flooding. Further, the University of North Dakota, the hospital, both cities' governing facilities, many schools, day care facilities, churches, and other public buildings and businesses were hit hard by the flood.

Infrastructure did not escape damage. Streets were flooded and the Point, Sorlie, and Kennedy bridges between Grand Forks and East Grand Forks (as well as other bridges within each city) were closed. The Grand Forks and East Grand Forks water plants and sewage lift stations failed, and basic services such as water and sewer treatment could not be provided (in some areas for more than three weeks). Electricity was out in most areas of both cities; telephone service was disrupted.

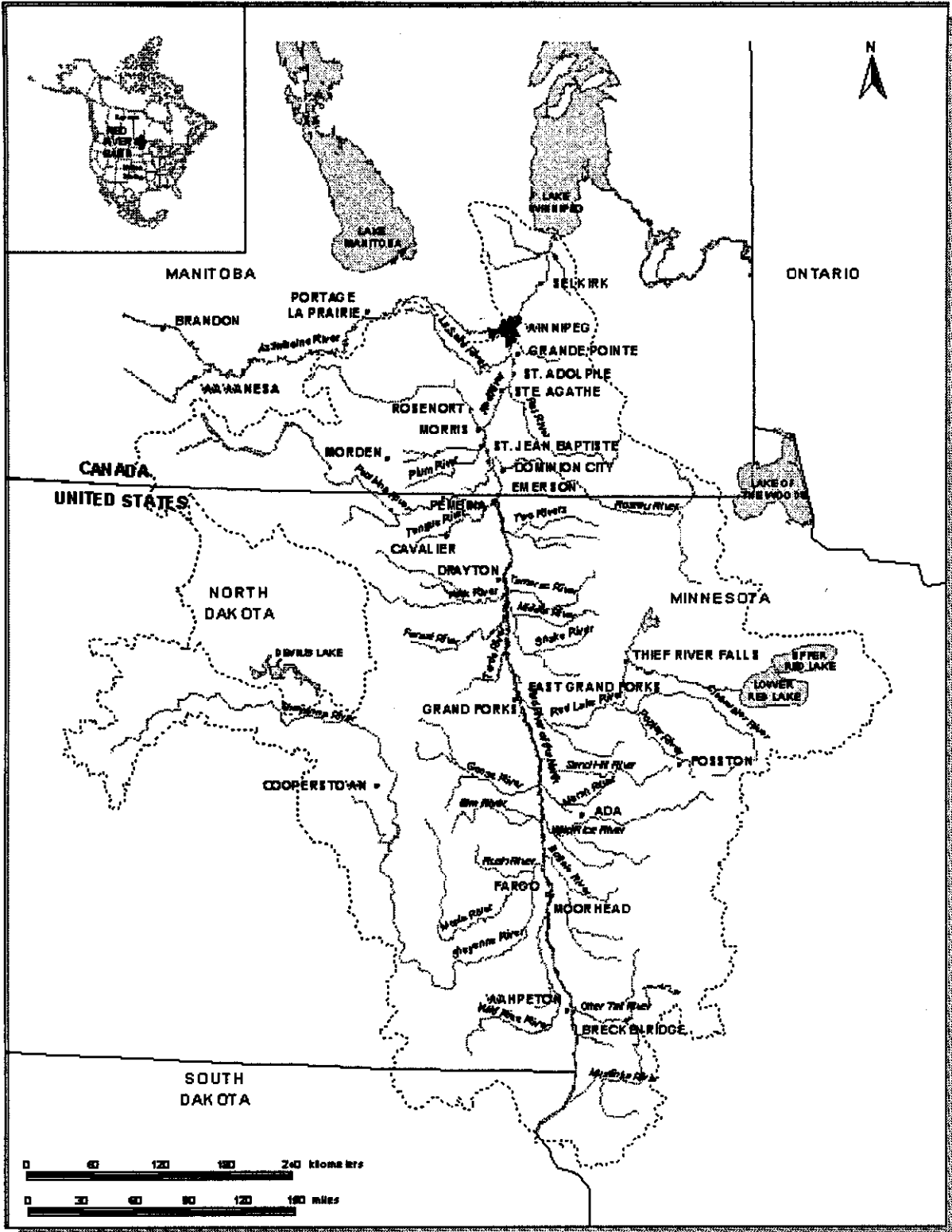
In all, it was the worst disaster per capita in the United States. The Corps of Engineers estimated the total flood-related damage in the Grand Forks and East Grand Forks area to be between \$1 and \$1.5 billion. The cities are still recovering.

An Overview of Response and Recovery Assistance

Response to the flooding in the two cities began long before the flood crest, and before the last of the blizzards hit the region. Sandbagging to augment the existing levee systems began in late March. Citizen volunteers assisted city, state, and federal crews in what ultimately became a fruitless effort. When the levees failed, extensive evacuations required establishment of shelters, which were opened around the region in schools, colleges, and other public facilities.

Emergency operations themselves were mostly headquartered at the University of North Dakota as the Grand Forks city government, the Emergency Operations Center, the Federal Emergency Management Agency, the U.S. Army Corps of Engineers, the Small Business Administration, the American Red Cross, the U.S. Coast Guard, the Salvation Army, the North Dakota Department of Transportation, and others moved their operations onto University property.

On April 7, 1997, President Clinton declared the states of North and South Dakota presidential disaster areas; the declaration for the state of Minnesota came a day later. This action made designated areas in these three states eligible for federal funding under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act). It further made the resources of all



Drainage Basin of the Red River of the North

federal agencies and departments that are named in the Federal Response Plan (more than two dozen) available to support the response and recovery in the three states.

Generally, the Stafford Act, which is administered by the Federal Emergency Management Agency (FEMA), makes federal funds available to help pay for the cost of disasters (on a 75% federal and 25% state/local cost-share basis) in three major categories: emergency measures and debris removal, public assistance, and individual assistance. Emergency measures are those carried out to deal with the emergency itself, such as costs associated with flood fighting or evacuating victims, as well as the costs of debris removal in the aftermath of the event. Public Assistance provides funding for the reconstruction, repair, or replacement of public facilities and infrastructure lost in a disaster, also cost-shared on a 75/25 basis. Such facilities include, for example, roads, bridges, public schools, water and sewage treatment systems, and local government facilities. Individual Assistance, on the other hand, is designed to provide financial assistance to individual victims of a disaster and comes in the form of Individual and Family Grants or Disaster Housing grants.

FEMA also administers a Hazard Mitigation Grant Program, which provides additional federal funds in the post-disaster time frame to finance permanent, cost-effective hazard mitigation measures. Such grants are also made on a 75/25 cost-share basis.

The level and extent to which other federal agencies get involved in disaster recovery depends very much on the event itself. In the case of the Red River floods, in addition to FEMA, the Small Business Administration (SBA), the U.S. Department of Housing and Urban Development (HUD), the U.S. Department of Commerce Economic Development Administration (EDA), and the U.S. Army Corps of Engineers (Corps) all were deeply involved in the recovery activities of Grand Forks and East Grand Forks. Their contributions are described in more detail in the next section.¹

While the kind of response described above is typical, on April 22, 1997, President Clinton took the unusual step of visiting the Greater Grand Forks area himself. At that time he announced the creation of a task force of Cabinet-level agencies to develop a long-term recovery plan for the area under the direction of FEMA director, James Lee Witt. This type of task force, though not unprecedented, is rare. Clinton also announced that FEMA would pay 100% of the eligible immediate emergency response work (rather than the usual 75% federal-25% state/local split). Later, the 75/25 split normally required for other federal relief provided in public and individual assistance payments was adjusted to a 90/10 formula.

The Corps undertook an extensive levee/diversion analysis to assess alternatives for future flood protection in the two cities, spending between \$4 and \$5 million on preliminary reports and planning. The results of this analysis are described in the section on levees, below.

At the state level, in addition to numerous state agencies responding to the emergency itself, Minnesota Governor Arne Carlson established the Minnesota Recovers Disaster Task Force to coordinate flood recovery in all 59 counties that were included in the disaster declaration. Similarly, North Dakota Governor Ed Schafer named a State Flood Recovery Coordinator in June 1997. Although Grand Forks and East Grand Forks clearly were among the hardest-hit areas, it is important to note that flooding impacted nearly all communities in both states.

The flooding gained national media attention, and the response from the nongovernmental community was extraordinary. Perhaps most unique was the donation made by Joan Kroc, the McDonald's restaurant heiress (initially anonymous, and called "The Angel") of about \$20 million to the Grand Forks area. The intent was that each household in the mandatory evacuation areas would receive a \$2,000 grant from this Angel Fund. Other organizations were also very generous.

General donations received from around the country were combined into either the Greater Grand Forks Relief Fund or the '97 Flood Relief Fund. These funds, and grants awarded from them, were administered by the North Dakota Community Foundation.

¹ For a detailed description of the types of programs these agencies (and others) have available for recovery assistance, the reader is referred to the *Framework for Federal Action to help build a Healthy Recovery and a Safer Future in Minnesota, North Dakota, South Dakota* report published May 1997.

Donations of non-cash items were coordinated by various agencies such as the American Red Cross, the Salvation Army, and the Flood Clearinghouse in Fargo, North Dakota, and were complemented by many volunteers who came to the cities to help with clean up and recovery.

Financial and Technical Assistance for Recovery of Buildings and Infrastructure

As noted above, the Project Team limited this investigation to the flood resilience of structures. This section provides a more detailed account of the recovery assistance that was received in Greater Grand Forks that was targeted towards the recovery of damaged structures, including residences, commercial facilities, the University of North Dakota, the Grand Forks water treatment plant, roads and bridges, and public schools. It also includes a discussion of the proposed levee and an overall description of technical assistance received in the area.

Not all the information presented is fully parallel for both Grand Forks and East Grand Forks, because the level of detail obtained by the Project Team varied among the cities and the various programs. Further, it is important that the reader understand that recovery from the 1997 flood is still underway in the two cities. The figures included in the description below are approximate and do not reflect changes occurring after data collection was completed.

Residences in Grand Forks and East Grand Forks

In this section on residences, information is presented in three categories: funds for acquisition of homes, funds for repair of homes, and technical assistance provided to homeowners.

Funds for Acquisition of Damaged and/or Flood-prone Residences

As of March 12, 1999, nearly \$48 million had been expended in a voluntary acquisition program in the City of Grand Forks, where about 800 flood-damaged or flood-prone homes have been or will be purchased. Of these, 607 have actually been demolished and a few have been moved (at an additional cost of \$4.9 million). The funds came from the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (a 75/25 federal/local cost-share) and the U.S. Department of Housing and Urban Development's (HUD) Community Development Block Grant program. The deeds for these properties have been transferred to the City.

The acquisition program has proceeded in phases, depending on the extent of damage to the homes and their flood risk. First, damaged structures located in the mapped 100-year floodplain are being removed, along with the damaged houses that lay within the proposed greenway, in the path of the proposed levee, or on the unprotected side of the dike. Some homes outside the 100-year floodplain that were substantially (50% or more) damaged were also purchased.

A condition of the FEMA Hazard Mitigation Grant Program money is that the land vacated by the purchase and removal of homes must be left in open space in perpetuity. As such, FEMA funds were used to purchase buildings in the area of most serious damage along the river where a proposed greenway will be constructed, along with a new permanent levee system (see discussion below). The land left vacated using funds from HUD's Community Development Block Grant program is not subject to such a condition. As a result, some of the land vacated by the Community Development Block Grant buyouts may be redeveloped in the future.

To assist residents impacted by the acquisition program, the City of Grand Forks allocated \$2 million in Community Development Block Grant funding for its Home Moving Program. This program was for homeowners in the proposed greenway, and provided a grant of up to \$120,000 or 75% of the total pre-flood value of the home (whichever was less) to move their homes rather than have them purchased by the City. Further, an incentive program tied to the buyouts disbursed \$3.5 million to 316 households. It offered \$10,000 grants to buyout participants who purchased an existing home and \$15,000 to those who bought or built a new home within Grand Forks.

To compensate for the loss of housing caused by the flood and the subsequent buyout of properties, the City donated 33 lots in a subdivision well out of the floodplain to Grand Forks Homes, a nonprofit corporation. The corporation constructed new homes on these lots priced between \$85,000 and \$130,000 with a short-term loan from HUD. The homes were built and sold by the end of 1997.

Based on this success, the City allocated \$4.1 million in Community Development Block Grant funds to purchase 50 more acres on the west edge of town for 193 additional Grand Forks Homes' houses. The home construction was financed with \$10 million in five-year bonds issued by the City and guaranteed by local bankers, a \$7.75 million loan from the Federal National Mortgage Association (co-signed by Grand Forks Homes and the Grand Forks Housing Authority), an additional \$3 million line of credit from the Federal National Mortgage Association in December 1998, and \$2.7 million in Community Development Block Grant funds. The homes range in price from \$105,000 to \$145,000. By the end of 1998, 12 of the houses had been sold, and by March 1999, purchase offers were pending on another 63.

In East Grand Forks, approximately 2,300 homes were damaged by the floods. Those that had the most severe damage and/or were located on the river side of the proposed levee system were targeted for an acquisition program. About 500 properties have been purchased with funds from FEMA's Hazard Mitigation Grant Program (\$14.5 million), the state of Minnesota (\$4.8 million), and HUD (\$28 million). The properties were purchased at pre-flood value, and any amounts the homeowner received from other sources, such as insurance claims, were deducted from that price. A condition of the East Grand Forks buyout program is that all the vacated land must be left in open space.

Because of the large number of acquisitions, East Grand Forks also needed to replace some of its housing stock. The City made use of FEMA's trailer park (brought in for temporary housing) infrastructure, having FEMA construct it in such a way that it will provide the basis for permanent infrastructure for new subdivisions in the future.

Funds for Repair and Rebuilding

In Grand Forks and East Grand Forks, FEMA provided almost \$54 million in Individual and Family Grants and Disaster Housing Program grants to 26,284 applicants. These grants are intended to provide for the immediate, serious needs and necessary expenses of victims that cannot be met through insurance or SBA loans. If the recipient of the grants resides in a mapped 100-year floodplain, then purchase of flood insurance is a condition of this aid.

Typically funds from these programs are small amounts per household and they go to replace the most essential personal and household belongings. However, based on the recommendations of the federal inspector who surveyed the damaged property, an individual applicant could qualify for an extra dollar amount for mitigation. As an example, in Grand Forks, of the nearly 22,000 applicants, about 3,000 received additional funds for mitigation. According to FEMA, most of these were for relocating the electrical main panel or circuit box up out of the basement, usually to a first floor closet. FEMA paid the full cost of this task (prices ranged from \$800 to \$1,500). There is no audit or follow-up done to see if the funds provided for mitigation were actually used for the purpose intended.

The U.S. Small Business Administration (SBA) provided 4,117 low-interest loans, for a total of \$87.3 million within Grand Forks County to repair and/or rebuild rental/owner-occupied homes. In Polk County, which includes East Grand Forks, the SBA provided a total of \$50 million in 1,401 loans for the same purpose. The only condition for these loans (related to flood resilience) was that if the structure for which the loan was acquired was located in the 100-year mapped floodplain, the loan recipient was required to purchase flood insurance.

In Grand Forks, the City's Rental Rehabilitation Program provided just under \$6 million (from Community Development Block Grant funds) in 10-year, no-interest loans to 350-400 landlords to repair flood-damaged apartment buildings. Payments were deferred for 5 years. The maximum loan amount was based on the size of the unit and ranged from \$5,000 to \$10,000.

About \$2.7 million in Community Development Block Grant and Federal National Mortgage Association funds were used by Grand Forks to disburse grants for the repair and rehabilitation of

flood-damaged homes outside the 100-year floodplain. The grants ranged in size from \$2,000 to \$15,000, depending upon the extent of damage. The grants could not duplicate FEMA, SBA, or insurance claims payments. In most instances, a lien was placed upon the house for the amount of the grant, and a portion of the grant must be repaid if the property is sold within a certain number of years.

FEMA estimated that 3,027 homes were cleaned (1,500) or rehabilitated/rebuilt (1,527) with the help of volunteer agencies in both Grand Forks and East Grand Forks.

About 4,000 rebates of \$200 each were given to Grand Forks households who replaced their flood-damaged furnace or oil burner with a 90% energy-efficient gas furnace. These funds came from the U.S. Department of Energy (DOE) through North Dakota's "oil overcharge" funds, administered through the state's Office of Intergovernmental Assistance. On the east side of the river, the Northern States Power Company disbursed \$357,000 to 1,017 flood victims (both residences and businesses) in rebates for the purchase of energy-efficient gas furnaces and water heaters. The East Grand Forks utility distributed \$200,000 in rebates (ranging from \$200-\$500) to home and business owners who replaced their flood damaged electric heat and hot water systems with upgraded energy efficient systems. These funds came from the state's annual DOE money, and were matched by an equal amount from the utilities themselves. There were standards for the efficiency of the furnaces and water heaters that were eligible.

In Grand Forks County, 2,253 claims for flood insurance payments were filed under the National Flood Insurance Program (NFIP) for a total of almost \$68 million. In Polk County, which includes East Grand Forks, 1,025 flood insurance claims were filed, for total payments of \$33.8 million. The vast majority of these were for damage to residential structures and contents.

Technical Assistance

In Grand Forks, shortly after the disaster was declared, FEMA set up a Recovery Center, which housed a variety of resources that people could draw upon. It included

- extensive information (handouts, pamphlets) on household mitigation measures such as drawings of how to elevate appliances above flood levels
- displays (including a Plexiglass "Mitigation House")
- personnel to help flood victims determine what they needed to do and how to accomplish it.

FEMA's contractors did a structure-by-structure inspection for damage and potential mitigation measures. Often the inspectors provided technical advice to the homeowner about proper rebuilding and ideas for lessening future damage. FEMA held training workshops for building inspectors and mitigation handouts were mailed to everyone who applied for assistance.

The FEMA/American Red Cross booklet, *Repairing Your Flood Damaged Home*, which includes mitigation and floodproofing advice, was used by the Red Cross in its recovery activities; the same booklet likely was used by other agencies as well.

HUD opened an office in Grand Forks after the flood, staffed from May through November 1997 with personnel from the Denver office. Their purpose was to facilitate the administration of the HUD assistance funds, to provide technical support to the City on its various housing rehabilitation initiatives, and to assist with the housing quality inspections. An assortment of HUD personnel came in and out of town as needed: attorneys to analyze consistency with the Stafford Act and avoid duplication; staff to coordinate with the outside consultants; environmental officers to examine the Environmental Assessments.

In Minnesota, the approach was that flood victims should first look to flood insurance, FEMA aid, and SBA loans and grants, to make them "as close to whole" as possible. The state, city, and federal agencies cooperatively put together rehabilitation packages for each household to explore each of those assistance options in turn. A one-stop center was established for people to visit when they were ready to rebuild. Personnel analyzed each household's situation and were then able to offer a combination of appropriate assistance. If the property was a candidate for a buyout, then a purchase

offer could be made, along with a low-interest loan for the down payment for a new home, or for another lot in a flood-free area, as incentives for relocation.

Consultants were hired with Community Development Block Grant funds to "hold the hand" of the City of East Grand Forks as it began the recovery efforts. Dealing with housing problems was a priority.

Inspectors from the Minnesota Building Officials organization came to East Grand Forks to help with inspections and to work with the local chapter of the building officials' organization. They verified that the cleanup had been properly done (sanitizing and complete drying of components) before rebuilding could take place. An engineer from Hennepin County Public Works Department provided technical assistance for two months. He inspected residential basements to verify structural stability so people could move back in.

Two staff people from FEMA and two from the Minnesota Department of Natural Resources completed surveys of all the homes and businesses not part of the buyout in order to determine which were more than 50% damaged. They spent about two weeks each, but follow-up and coordination continued much longer.

It should be noted that reconstruction of all the residences that were not part of the cities' buyout programs were subject to the provisions of the communities' local floodplain ordinances. If a structure was substantially (more than 50%) damaged, the ordinances require that the building's habitable space must be elevated above the 100-year flood level when it is rebuilt. If a building was not substantially damaged, it could be rebuilt to the preflood situation. A complicating factor to enforcing the substantial damage rule is that if the proposed levee is built as planned, many of the homes—even those substantially damaged—would not have to be elevated, because the levee will remove them from the mapped flood hazard area. As a result, in East Grand Forks, some property owners have been allowed to reconstruct to their preflood state, pending a final decision on the levee.

Commercial Buildings

Grand Forks

Grand Forks lost 40 downtown commercial buildings to flood and 11 to fire; all were substantially (more than 50% damaged). A total of about \$4.5 million in recovery assistance from HUD (Community Development Block Grant) and insurance claims payments was used for a voluntary acquisition program to remove about 27 commercial structures from the floodplain downtown. About \$500,000 in FEMA funds were used to help with the clean-up and demolition aspects of the projects. Recovery assistance from the EDA and Community Development Block Grant funds (about \$3 million and \$5 million, respectively) were used, along with about \$5 million in bond money, to build the new Corporate Center on the site of some of the demolished structures. The complex consists of about 100,000 square feet of office space in two buildings connected by a walkway. The City's intention in creating this new complex was not only to help restore commercial space downtown but also to keep businesses from leaving the central business area and heading to the mall areas south of town. The Corporate Center is owned by the City's nonprofit public development corporation, which leases the space and puts the proceeds into the City's Growth Fund—a revolving fund for economic development, infrastructure, and property tax relief. Long-range plans call for situating a new Town Square on some of the vacated lots downtown; new structures may eventually be built on others.

The SBA provided \$48.5 million in 835 loans for physical damage to businesses and \$18.7 million was spent on 681 financial loss loans to businesses in Grand Forks. HUD provided about \$10 million to the city for business assistance, mostly repair of buildings and replacement of lost inventory. Additional Community Development Block Grant funds, financing packages, and private donations were used for recovery-related purposes: downtown beautification, incentives to keep small businesses and shops downtown, and other improvements.

A revolving loan fund was established with Community Development Block Grant funds (\$2 million) to help 95 flood-damaged businesses with equipment and building purchases, equity investments, and other purposes deemed to contribute to the local tax base. EDA funds (\$2 million,

with a 10% city match) were used to set up another fund for similar purposes. Community Development Block Grant funds were also used to provide \$135,000 in grants to businesses that had obtained SBA loans for recovery and were therefore required to purchase insurance. Grants out of this fund reimbursed the businesses for up to five years or \$5,000 worth of flood insurance premiums.

Using a combination of EDA (about \$5 million) and Community Development Block Grant (about \$1.7 million) funds, an office/warehouse building (known as Noah's Ark) was constructed in the industrial area west of town and out of the 100-year floodplain. FEMA had installed roads, water, and sewer at the site to support a village of temporary mobile homes, and after those were removed, the City bought the land and built the 168,000-square-foot building. It was used for short-term business sites for eight or nine businesses that were flooded out; a few have made it permanent. Now the city leases the space in the building and will use the surrounding land for future industrial development. The Ark is owned by the City's nonprofit public development corporation. Proceeds from the leases go into the City's Growth Fund.

To further commercial recovery and redevelopment, EDA provided a \$1 million contract for technical assistance for Grand Forks to bring in planners from Chicago, California, and other locales. The people under contract, plus key staff from the Denver EDA office, a couple of compliance officers, and a dozen or so other people came and went as needed through the months, staying for weeks at a time if necessary. A state representative from Missouri stayed six to seven weeks. Further, the SBA had loan officers on site for weeks. Likewise, the HUD Community Development Block Grant people were in and out from Denver and other sites as needed.

In addition, Camiros Ltd., was hired under a technical assistance contract that was funded by HUD. This firm worked with the Downtown Development Commission to transform local ideas into a feasible plan for making the downtown a vital, mixed-use center, integrating flood mitigation improvements with the river-front design, promoting and marketing investment opportunities, and implementing catalyst projects, such as the Corporate Center and proposed Town Square. Outside entities, such as state and federal agencies and the Urban Land Institute, sponsored and organized many group and community gatherings—including the Community Conversations organized by the North Dakota Consensus Council—to contribute to development of the strategic plan.

East Grand Forks

The EDA provided \$4.6 million in recovery assistance to East Grand Forks. Of this, \$1.3 million was used to rehabilitate the flood-damaged shopping center/mall in the central business district. About \$3 million went to the exterior construction of two buildings to help reestablish the waterfront area where there is a walkway and shopping area, to repair/rehabilitation of the walkway itself, and to construction of six parking areas in the central business district.

Part of the downtown redevelopment is an "invisible flood wall"—a removable segment of the proposed levee system, and which is currently under construction. The invisible flood wall concept is designed to allow people visual and physical access to the river and waterfront area when the river is at normal stage. But when higher water stages are expected, the wall segment can be installed quickly to provide flood protection. Once flood danger has passed, the wall can be removed again. Funds for 80% of the cost of the flood wall came from EDA (about \$1.3 million), with the rest supplied by HUD and the state.

The SBA provided 1999 loans for a total of \$14.6 million for physical damage to businesses, and 180 loans for a total of \$4.3 million for financial losses to businesses in Polk County, Minnesota, which includes East Grand Forks.

About \$20 million from HUD was targeted by the East Grand Forks City Council for downtown redevelopment. Of that, about \$5 million went to redevelopment of Cabello's, which the City expects to bring in 125 new jobs and be a magnet for other downtown commerce. Smaller amounts went to planning and design downtown.

Community Development Block Grant funds were used to hire consultants in recovery issues to help the City develop a plan and begin to implement it.

The University of North Dakota

The University of North Dakota (UND) had an estimated \$75 million loss. Seventy-four buildings were damaged and there was extensive damage to infrastructure including sanitary sewers and sewers; steam distribution; water mains and service lines; telecommunications; power distribution; landscaping; site lighting; and streets, roads, and parking lots.

Under its Public Assistance Program, FEMA provided \$36.5 million for repair and reconstruction of roads, buildings, and utilities at UND. To receive FEMA funding, UND's sites had to meet a number of conditions, including the provision that they could only be restored to the preexisting condition and that flood insurance be carried in the future. Additional mitigation funds for floodproofing activities could be provided if they were cost effective. Most mitigation funds went for small projects (e.g., floodproofing elevator float switches) on a building-by-building basis. Of the \$36.5 million UND received, only about \$240,000 was earmarked for mitigation, most of it in small (\$2,000-4,000) amounts for individual buildings.

About \$2.5 million was paid to UND in insurance claims (primarily from North Dakota Fire and Tornado). UND received additional grant monies, equipment, and in-kind donations; had subscription fees and organizational dues waived; and received money from an Alumni Foundation fund drive. Flood-related grant and contract awards totaling \$1.5 million either assisted with research assessment, recovery, or coping with the flood or helped to provide funding for interrupted research projects. Flood-related alumni donations, totaling \$1.7 million, were either designated for specific departments or were slated for student recruitment to attempt to recover the student population that had dropped by about 900 students after the flood. Finally, UND received the ability to borrow up to \$12 million to cover the cash flow of the insurance and FEMA commitments.

In regard to technical assistance, UND received help from FEMA and the state. For example, FEMA sent a team of technical assistance contractors to assess damage and review the University's insurance policies and determine those losses covered by insurance. In addition, UND hired their own technical experts (using FEMA funds--the administrative allowance) to help with damage assessments and recovery. These experts--David M. Griffith & Associates, Ltd.--sent a three-person disaster grants management team to train and work with UND's recovery staff team. A third type of technical expertise was provided by Barton Malow Company's construction managers: they did damage assessments at no charge and were later hired to oversee and coordinate all project rebuilding and consulted on mold problems.

Grand Forks Water Treatment Plant

The Grand Forks water treatment plant was completely shut down because of the flood. It had a large amount of sediment in it and many electrical and chemical problems. Simply cleaning out the entire system posed major difficulties. Funding of almost \$6.5 million was received from FEMA's Public Assistance program (cost shared by the state at rates ranging from 10 to 25%) for repairs to and reconstruction of the system. That amount included about \$300,000 worth of mitigation measures that were cost shared with the state at a 90/10 ratio. Additional mitigation was carried out with \$48,000 from FEMA's Hazard Mitigation Grant Program (cost shared with the state at a 75/25 ratio).

FEMA and HUD representatives provided technical assistance by reviewing the flood mitigation plans. A local engineering firm, Advanced Engineering, provided all of the mechanical technical assistance. The North Dakota Public Health Department sent a team of people to help restore water quality. The Environmental Protection Agency helped with disposal of some boiler treatment chemicals.

Roads and Bridges

In Grand Forks the Federal Highway Administration spent \$2 million on the repair of streets damaged by trucks hauling debris; \$26,000 was spent on other types of street repair; \$96,000 on signal systems; and \$60,000 on lighting. The funds were given to the North Dakota Department of

Transportation and then to the City of Grand Forks. No conditions were put on the funds except that they had to be used to repair roads.

FEMA's Public Assistance program paid \$217,565 to Grand Forks for repair/rehabilitation of roads; none of this was targeted for mitigation. Under FEMA's Hazard Mitigation Grant Program, \$83,052 was awarded for replacement of culverts or installation of new ones.

Two inspectors were sent to Grand Forks from the Federal Highway Administration to go through the city and do damage assessment and advise on methods for road repairs.

In East Grand Forks \$1.9 million of Federal Highway Administration funds was spent for shoulder and culvert washouts, detour damage, and a bike path washout. Supplements totaling between \$50,000 and \$100,000 went for the repair of streets damaged by trucks hauling debris. This aid could only repair roads to their previous condition, and did not necessarily address long-term mitigation. The funds flowed to the Minnesota Department of Transportation and then to East Grand Forks. One condition was that the repair work had to be more than \$3,000, otherwise it was considered normal maintenance.

Public Schools

The Grand Forks Public School District suffered \$72.4 million in damage to 16 of its 22 buildings; three had damage exceeding 50% of their value. The district received \$21.5 million in damage claims payments under its commercial insurance. FEMA's Public Assistance program provided about \$36 million and the state's share was \$4 million. One of the substantially damaged schools was relocated; the two others were consolidated and rebuilt on one of the sites, but elevated. The school district cleaned and reconstructed the rest of the schools, incorporating many mitigation measures in the process. FEMA and the State Emergency Services staff provided technical assistance of all forms on regulations, processes, and procedures.

In East Grand Forks, all of the school buildings were lost to the flooding and three new buildings had to be constructed. FEMA paid 63% (\$25.8 million) of the \$41 million that was needed for the construction. The rest was provided by state grants. A condition of the FEMA assistance was that all the new buildings had to be out of the 100-year floodplain. Further, although the school district had no insurance before the flood, it will have to carry flood insurance in the future in order to be eligible for federal aid. The school district also received \$350,000 in donations from around the country, usually without conditions. FEMA personnel or their technical assistance contractors did the damage survey reports for the schools and FEMA approved the sites for the new buildings.

The Levee

Even before flood waters receded, discussion was underway of alternative long-term flood protection for the cities of Grand Forks and East Grand Forks (which traditionally have relied on the emergency strengthening of existing temporary levees for flood protection). In January 1994 the U.S. Army Corps of Engineers initiated a cost-share feasibility study for local flood protection for Grand Forks. The final report was scheduled for September 1997, but was never finalized due to the flood. In May 1997, at the request of the City of East Grand Forks, the St. Paul District of the Corps reactivated a flood control feasibility study for East Grand Forks that had been suspended in 1987, due to local opposition to the cost and the location of the dikes. The Corps recognized that neither city could be protected from large floods independently, so flood protection for Grand Forks was added to the East Grand Forks study.

In November 1998, the Corps published the *General Reevaluation Report and Environmental Impact Statement* with the results and recommendations of that 18-month study. The study involved extensive public involvement and review of seven different flood reduction strategies (ranging from a "no-action" alternative, to basin-wide flood reduction measures such as upstream storage, to diversion plans on both sides of the Red River). The study cost the Corps \$3-\$4 million in fiscal year 1998, and will probably cost \$1 million in 1999.

The alternative recommended by the report consists of approximately 26 miles of permanent levees, floodwalls, and raised roads. In addition, recommendations are made for small diversion channels to direct flows to tributaries during floods, riprapping of some river banks, and removal of an existing pedestrian bridge. The Corps reports that this alternative provides the cities with a 210-year level of protection and, with its recreational benefits, has an overall benefit-to-cost ratio of 1.10. The areas of the two cities that would be protected by the levee project, if it is constructed, would be removed from the regulatory 100-year Special Flood Hazard Area as identified on Flood Insurance Rate Maps issued by the FEMA.

The total cost of the levee system is projected to be \$350.4 million. The major conditions upon which federal assistance is provided for the project are:

- The local sponsors (the cities of Grand Forks and East Grand Forks) must provide between 35% and 50% of the total structural flood control project costs and 50% of the recreational portions. The governor of Minnesota pledged to pay all of East Grand Forks' share. Grand Forks has obtained approval from the North Dakota State Legislature for the state to pay \$52 million and is planning to finance its remaining \$63 million share by selling bonds. Grand Forks is also expecting to pay an additional \$46 million for levee-related projects.
- The localities or states must cover 25% of the design costs.
- Local sponsors must assume full responsibility for operation, maintenance, and repair of the levee system (estimated at \$564,000 annually).
- Local sponsors must agree to participate in and comply with the National Flood Insurance Program.

As of February 1999, the federal funding commitment for the levee was made when the project was authorized in the 1998 Omnibus Spending Bill; the appropriation is expected in the 2000 budget. The Corps is continuing with more detailed design on the project. After the first of the fiscal year (October 1, 1999), the Corps and the local sponsors will sign a Project Cooperative Agreement. Barring unforeseen complications or delays, construction of the levees, which will be managed by the Corps, will begin in 2001 and be completed in 2003 in East Grand Forks and 2004 in Grand Forks.

A Note on Technical Assistance for Overall Recovery

There were numerous FEMA staff and contractors (with a variety of expertise) in Grand Forks, talking and working with their state and local counterparts on recovery matters more or less continuously for months. As a small example, one FEMA staff person was named City Liaison for Recovery and essentially became the Grand Forks mayor's "right hand" for six months, helping anticipate, plan for, handle, and implement decisions and ideas to help the town recover. Another staffer worked full-time on public assistance mitigation for 11 months.

As noted in sections above, both EDA and HUD provided funds to provide technical assistance to the City of Grand Forks. Depending on the needs of the City, various consultants were hired to carry out tasks such as

- managing and planning the whole recovery effort, from short-term to long-term
- establishing and managing the communications system throughout the City
- providing and finding personnel needed for recovery work
- identifying options for future mitigation
- coordination with the Corps
- coordination with City Council
- internal communication technology
- providing planners, architects for downtown redevelopment, future housing
- establishing accounting and internal control procedures for the use of the recovery funds
- hosting charrettes and helping citizens visualize the future downtown/riverfront area.

The comments of John O'Leary, Director of the Office of Urban Development for the City of Grand Forks, illustrate one aspect of the technical assistance received by one City department in the recovery effort. He believed that the Grand Forks recovery was a model for how the process should work. He was highly complimentary of the coordination, the attitude, and the quality of help the city received from the federal agencies—HUD, EDA, and FEMA, and SBA, in particular, since those are the agencies most concerned with the housing issues for which his office was responsible. According to O'Leary, the federal personnel showed up dressed ready to work (in jeans and flannel shirts rather than business suits) with their sleeves rolled up, while there was still water everywhere. They asked what needed to be done and pitched in even with the cleaning up. When that was accomplished, their attitude was, "What does the City want to do about this problem or that problem?" Their actions demonstrated that their goal was to help the City recover the way it wanted, and not the way the federal agencies wanted.

In Minnesota, a stronger state role in technical assistance was evident as EDA and Community Development Block Grant funds were used to hire Flood Coordinators at the state level. Their job was to get the flooded localities throughout the state thinking about long-term recovery right away, so the best use could be made of the funds available. The Flood Coordinators held a series of meetings, in which East Grand Forks had the opportunity to participate. This allowed representatives of flooded towns to say what they thought they would need in the way of assistance for recovery and rehabilitation. Then the funding entities met in St. Paul and mixed and matched their money to meet the needs of the localities.

Recovery Assistance from Nongovernmental Organizations

Recovery assistance from nongovernmental organizations in the wake of the 1997 floods was substantial. The Project Team has not attempted to document all of the assistance provided, but instead describes below the activities of three organizations, which can be considered examples of the type of assistance provided by nongovernmental entities and the conditions placed upon it.

Otto Bremer Foundation

In 1997, the Red River floods were a thematic focus of the funds awarded by the Otto Bremer Foundation, headquartered in St. Paul, Minnesota. The Foundation granted nearly \$3.5 million (about one-fourth of the approximately \$14 million in total grants that year) to flood recovery in the valley. One and a half million dollars of that were given to the Bremer Foundation by the Bush Foundation for flood recovery. Of the full amount for flood recovery (\$3.5 million) 82% (\$2.8 million) was awarded in 92 separate grants to organizations (primarily non-profit groups such as churches and public schools) in Grand Forks and East Grand Forks or to organizations that were supporting flood recovery in those two cities (such as to the North Dakota Community Foundation in Bismarck, North Dakota).

The bulk of the funds were used to help nonprofit groups restore buildings and programs. In reviewing the list of grants awarded, the Project Team conservatively estimated that approximately 30% of the grant funds (\$831,000) was used for actual reconstruction or repair of structures (as opposed to replacement of equipment, for example). The funds were awarded without any conditions for mitigation, floodproofing, or similar measures in the reconstruction process. The Foundation's policy is that the local people requesting the funds are in the best position to know what the most appropriate use of the money would be.

A few of the Bremer grants went to organizations to provide technical assistance for flood recovery and flood reduction in the Red River Valley. For example, the Minnesota Center for Environmental Advocacy in St. Paul received funds to provide scientific expertise for groups participating in a mediation process addressing flood reduction in the Valley, and the North Dakota Academy of Sciences received a grant to support conferences on Red River Valley flood mitigation.

The North Dakota Community Foundation

As donations from around the country began arriving in the State of North Dakota, Governor Ed Schafer asked that the North Dakota Community Foundation (NDCF), based in Bismarck, serve as the administrative body to accept and disperse the funds. The NDCF managed three major funds: (1) the Angel Fund, which was a \$20 million donation from McDonalds' restaurant heiress, Joan Kroc; (2) the 1997 Flood Relief Fund, which was a state-wide fund (sometimes known as the governor's fund); and (3) the Greater Grand Forks Relief Fund (also known as the mayors' fund).

Individual \$2,000 Angel Fund grants were dispersed to households located in mandatory evacuation areas in Grand Forks and East Grand Forks. No conditions were placed on how the money was to be used. It was assumed recipients used the money to cover their immediate needs for food, clothing, and shelter.

The Flood Relief Fund ended up with approximately \$1.8 million to distribute in grant monies. An advisory board comprising people from throughout the Red River valley guided the distribution of funds. Based on information from FEMA, it was determined what percentage should go to which communities and about 80% went to Grand Forks and East Grand Forks. Funds were awarded primarily to nonprofit organizations and were used for a variety of purposes ranging from replacing lost equipment to funding artists-in-residence to repair and reconstruction. No conditions for mitigation were placed on these funds.

About \$865,000 was collected in the Greater Grand Forks Relief Fund, and grants were awarded with the assistance of an advisory committee of the mayors of Grand Forks and East Grand Forks and other city officials. As with the Flood Relief Fund, grants went to nonprofit organizations for a wide range of uses with no specific provision for mitigation.

In addition, the North Dakota Community Foundation administered a number of individual accounts. One example was \$150,000 from the Elks, which was designated for helping day care programs get back in business.

In all, the North Dakota Community Foundation administered around \$23.5 million in donations. One hundred percent of all the donations received went directly to flood relief, because the Foundation received grants from the Otto Bremer and Northwest Area foundations to help cover the operational and administrative costs.

Church Groups

Recovery assistance from church groups was also substantial. Lutheran Brotherhood, only one of the numerous religious donors, provided \$1.8 million in flood assistance to Grand Forks and East Grand Forks. Of that, about \$700,000 was granted for church repair and individual congregational needs; \$640,000 to Lutheran Disaster Response and Lutheran Social Services for Wellness Recovery and Unmet Needs of families; \$255,000 for synod and district ministries to the cities; and \$180,000 for community needs in Grand Forks and East Grand Forks (schools, day care centers, and other nonprofit agencies). Lutheran Disaster Response worked closely with Catholic Family Services, Upper Midwest Recovery of the United Methodist Committee on Relief, the Salvation Army, and the United Way to provide volunteers for the repair of homes under the Unmet Needs Program. Lutheran Disaster Response and Lutheran Social Services received other funding, such as a FEMA contract for mental health disaster outreach. The organizations tried not to duplicate assistance received from FEMA or SBA. No conditions for mitigation were placed on these funds.

Summary

There was a wide variety of types of assistance provided to the Greater Grand Forks area to help in the recovery efforts. Individuals, businesses, municipalities, and groups of all sorts received financial assistance in the form of grants; loans with a variety of generous provisions including no interest, low interest, deferred payments, and potential for forgiveness; claims payments both from

general homeowners' and business insurance and from flood insurance. Some of the recovery funds came with conditions attached: either they were to be used only for a specific purpose, or applied only to certain categories of structures, or were only available upon agreement by the recipient to take additional action of some sort, such as agreeing not to sell the building for a certain period, or purchasing flood insurance. All the conditions that accompanied the financial aid are not detailed here, but those that pertain to building Basin-wide resilience are described in the discussion on resilience, below. On the other hand, some funds were provided with wide latitude in how they were used.

Technical assistance likewise came in many forms and from many sources. At a minimum, federal and state agencies who provided funds typically also provided guidance on the administrative aspects of applying for and utilizing those monies, and on using them to meet the goals for which they were intended. This was a small proportion of the technical assistance received after this flood, however. Many federal and state agencies assigned numerous personnel the specific tasks of helping the communities and individuals recover and mitigate future losses. These personnel included specialists in engineering, law, housing, code enforcement, building practices, planning, economic development, and environmental issues, to name a few. At least two federal agencies provided large contracts with outside consultants to bring them into the area to make expert advice available. Written materials (brochures, handouts, manuals, newspaper articles) also played a role in letting people know what to do about repairing their damaged buildings, what could be done to minimize their risk next time, and so forth. Few if any conditions were attached to the technical assistance that was provided to the area.

A third type of recovery assistance was provided by the many non-profit entities, charitable organizations, church groups, and others. For the buildings examined during this project, this assistance mostly took the form of cash, volunteer labor, and donated materials for repair and rebuilding.

In general, efforts to avoid duplication of recovery assistance were fairly widespread. No doubt some instances of taking advantage of the situation could be uncovered, but the government agencies, private entities, and nonprofit groups had a systematic means of coordinating their programs both to provide people with the widest range of help available and also to prevent misuse of the opportunities. The voluntary agencies also took steps to avoid, for example, providing free building materials to a homeowner who already had received an insurance claim to cover the damage.

IV. RECOVERY ASSISTANCE IN MANITOBA

The Study Areas

Rural Municipality of Ritchot

The Rural Municipality (RM) of Ritchot is located immediately south of Winnipeg. It spans the Red River just south of St. Norbert and the Floodway that protects Winnipeg, and consists of an area of 144 square miles. Its population is about 5,300, with a majority of the people living in the towns of St. Adolphe, Ste. Agathe, Niverville, Ile ds Chenes, and the urban suburb of Grande Pointe. RM administration, located in St. Adolphe, is accomplished by a full-time administrator and a staff of three clerks. Public works is the responsibility of a supervisor and three equipment operators. RM personnel had received training in emergency management offered by the Manitoba Emergency Management Organization (MEMO). The RM is divided into four wards, each of which elects a councillor. In addition, there is an elected reeve. All are part-time officials.

Rural Municipality of St. Norbert

St. Norbert, a suburb of Winnipeg, is located immediately north of Ritchot. Approximately 9000 people live in the suburb. The La Salle River flows through the southern part of St. Norbert and enters the Red River north of the Floodway that protects the city. While there are a few homes south of the Floodway, most of St. Norbert is protected by it. As a suburb, St. Norbert is administered by the City of Winnipeg; its services also are provided by the City.

During the flood, both the RM and St. Norbert were evacuated—the former because of the high water on the Red River; the latter because of the threat that the flood waters might by-pass the Floodway and enter the City through the La Salle River system. Consequently, both the RM and the City were faced with the problems associated with evacuation, re-entry, and recovery. The time course of the significant events for the two regions during this period is presented in Table 1.

Impact of the Flood

Rural Municipality of Ritchot

At the peak of the flood, 132 square miles of the RM were flooded. This was almost 92% of its total area. More than 4000 people from over 800 homes were evacuated. After the flood, the RM processed over 1100 claims related to flood damage. Temporary housing (apartments or trailers that were placed on their properties) was needed for about 480 families (Figure 1). As of December, 1998, 18 families remained in temporary housing (see Table 1 for a time course for the return of families to their homes). After the flood, about 115 homes were condemned. Most were rebuilt to the new standards (see below) declared by the Province of Manitoba. Over the summer when mold problems became evident, additional homes were condemned. In excess of 250 wells needed to be rehabilitated; an additional 55 wells were capped.

St. Norbert

In contrast, there was little damage in St. Norbert. Thirty-two homes, many of these either south of the Floodway or immediately north of it, were damaged. Some homes had water damage; others had structural problems from flood-induced ground motion. Minimal damage to the infrastructure occurred.

The extent of damage in St. Norbert was several magnitudes lower than that in the adjacent rural municipality. The difference is attributable to protection provided by the operation of the

Table 1. A Chronology of Significant Events during the 1997 Flood.

Date	Province	RM Ritchot	Ste Agathe	Grande Pointe	St. Norbert
April 10		Begin raising ring dike (St Adolphe) by 2 ft.			
April 23	MEMO declares a mandatory evacuation	Declares State of Emergency.			City declares State of Emergency. Mandatory evacuation notices given to 51 homes south of Floodway.
April 25	MEMO recommends those still in mandatory evacuation zone leave.		Evacuated		
April 26				Seine River floods.	The 51 homes evacuated.
April 28					Mandatory evacuation notice given.
April 29			Dike breached.		Work starts on raising the east and west end of St. Norbert dike.
April 30					Evacuated.
May 2	MEMO establishes rural re-entry committee.			Unexpected increase in water level	
May 3				125/150 homes flooded.	
May 6	MEMO announces re-entry plans. Red Cross initiates flood relief plan				
May 8	Manitoba Flood Relief Committee established.				
May 12					Re-entry begins.
May 13		RM opens re-entry office in south Winnipeg.			
May 16					Flood claim coordinator hired by City.
May 17		St. Adolphe residents begin reentry.			
May 21	MEMO provides \$2500 advance assistance payments to RM residents.	RM's flooding bills (5% of annual budget) capped by province.			
May 26	Reception Centre for evacuee closed.				
May 30		Re-entry programs operational.			

Floodway, which, at peak flows during the flood, diverted a flow that exceeded its design capacity. The presence of the Floodway has been estimated to have saved Winnipeg from flood damage of up to \$10 billion. Yet, the fact that the 1997 flood required operation of the Floodway at levels beyond its design capacity does not bode well for the future when larger floods will occur. In fact, Booy (1997), a statistical hydrologist, has predicted that there is a 95% chance that a flood with 20% higher flow rates than the 1997 flood will occur within the next 50 years. Others have raised the same issue, and expansion of the Floodway is currently under discussion (Mitchell, 1999).

Transition into Recovery

On April 15, the RM anticipated that there would likely be an evacuation. Accordingly, they contacted the City of Winnipeg and requested that the City serve as the host community for the RM's evacuees. On April 23, the Province called for a mandatory evacuation. While some confusion surrounded this call, the RM proceeded to advise its residents of the evacuation. Evacuation orders and procedures were communicated hastily (see Rahman and Tait, 1997, for details). Subsequent to the evacuation, Ste. Agathe and Grande Pointe flooded from unexpected overland flooding.

Once the evacuation activity was completed, the RM started to plan for the recovery processes that would meet the needs of its people. This was virgin territory for the RM's administration—never before had they needed to stage a widespread reintroduction of the population following the loss of a large number of structures.

The RM's administration decided to hire a re-entry coordinator and to develop a recovery management system that closely modelled the political structure of the RM. A Flood Recovery Committee was formed. Each of the four wards was assigned a flood coordinator who lived in the ward. Initially, the Committee was at a location in St. Vital in South Winnipeg. As the waters descended, and people were to return to their homes, the Committee was relocated to St Adolphe, and then into the wards. The flood coordinators' responsibilities were to help the residents determine the type and source of assistance they required. To do so required clear information from the Province. Residents could phone or visit their coordinators, but the coordinators also visited people at home.

The initial delivery system for post-flood assistance in Ritchot is depicted in Figure 2. Residents in a particular ward contacted either the re-entry coordinator or their municipal councillor for advice. The latter would direct the resident to their coordinator. The coordinator would discuss the problem with the resident, provide the needed information or, if it were unknown, seek it out and then contact the resident. If the matter related to provincial requirements or to compensation claims, the resident was given the location in Winnipeg where the provincial authorities would deal with the problem. The resident would then go to Winnipeg and interact with the appropriate authorities.

This initial management system was not considered satisfactory to either the residents or the municipality. Too often residents were frustrated and angered by the absence of information, the changing nature of requirements, inconsistent advice, difficulty of access to offices and locations, and the onerous demands (given the emotional state that people were in) of moving around downtown Winnipeg. The municipal authorities raised these concerns with the Manitoba Emergency Management Organization (MEMO) and other rural municipalities reported similar problems to MEMO.

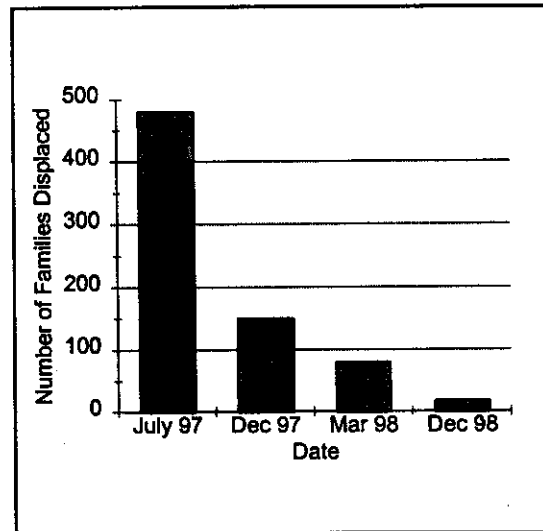


Figure 1. Number of Families Displaced from the RM of Ritchot after the 1997 Flood.

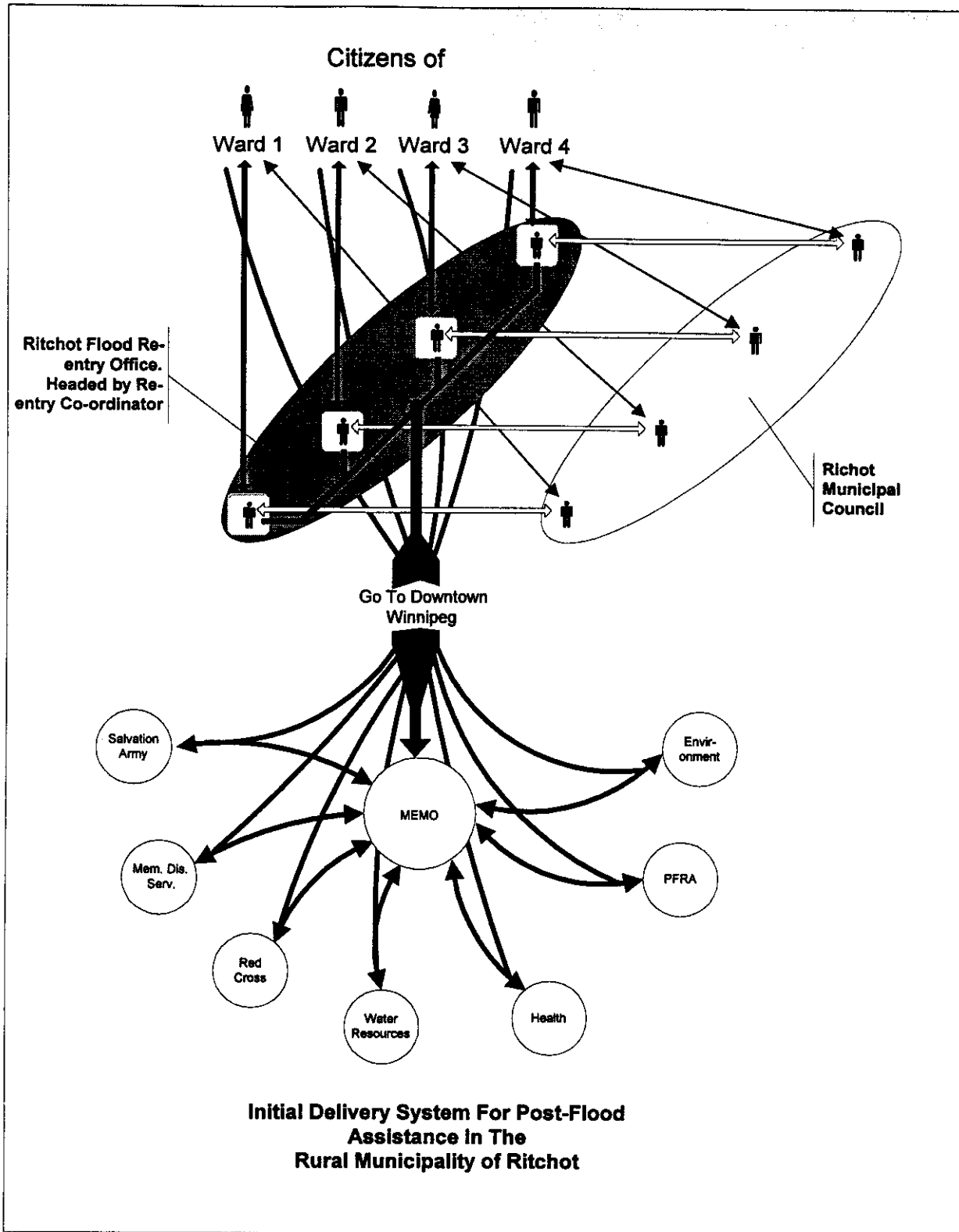


Figure 2. Initial Delivery System for Assistance in RM of Ritchot after the 1997 Flood.

As a result of the discussions with the RMs, MEMO opened three regional offices in the valley (at Letellier, Rosenort and St. Adolphe) in August 1997. The office in St. Adolphe was located within two blocks of the RM's re-entry office and housed representatives of the key recovery agencies. As a result, residents were provided "one stop shopping" for recovery assistance (see Figure 3). The services in the MEMO office changed over time, reflecting the needs of residents. The St. Adolphe office is still in operation at this time, although its activities are winding down.

Moving the services into the community had several beneficial effects. First, the stress of obtaining assistance was greatly reduced for the residents. Second, inter-agency communication was increased, at least in the regional offices. Third, communication between the municipal office and the provincial agencies was improved. In fact, the closeness of the two organizations permitted some joint problem solving and a much freer exchange of ideas and concerns. Problems in the operation of the office have been identified, for example, poorly trained assessors. However, most of the identified problems would have occurred in the absence of the regional centres. Overall, MEMO, the Reeves, and the residents viewed the evolution of community centres as a highly positive development. The Manitoba Water Commission concurred in its final report, and specifically identified the speedy introduction of such centres in the event of future floods in its recommendation #39:

MEMO coordinated flood recovery centres should be set up as soon as physically possible after reentry and staffed by pre-trained personnel capable of handling interviews, application forms and other aspects of the process. Local administrators should also be present where necessary.

Neither of the diagrams shown in Figures 2 and 3 represents the situation facing flood victims in St. Norbert. Once reentry occurred, the victims received little guidance from the City. Those that did not suffer unsalvageable damage were left to fend for themselves, in that the City, unlike the RM, did not provide local assistance with rebuilding problems. The City focussed on its infrastructure issues (making sure river bank destabilization did not occur as the waters receded, planning and establishing permanent dikes, maximizing payments from infrastructure programs, etc.) and not on that small portion of its population that suffered damage in the flood. Residents of St. Norbert had to either deal directly with the various provincial departments in downtown Winnipeg or travel to St. Adolphe and interact with the advisors located in MEMO's regional office. Both options were perceived as arduous and non supportive. The victims were left feeling abandoned in the City's "victory" over the flood.

What emerged during the initial part of the flood recovery process was a case management approach to dealing with flood victims. The strengths of this approach have been recognized by MEMO and it has modified its emergency plan (MEMO, 1999) to incorporate it into its future emergency operations. When executed properly, the approach minimizes the irritation of claimants, provides them a continuity that desperately needs to be reestablished in their lives, and provides an opportunity to identify early signs of psychological difficulties. The processes leading to its establishment during the flood of 1997 resulted, unintendedly, in the exact opposite effects.

In the remainder of this section, financial, structural, and social assistance programs are examined.

Financial Assistance

Legislative Basis for Government Assistance Programs

Federally, public welfare emergencies result when severe natural disasters or major incidents affecting public welfare are beyond the capacity or authority of a province to handle. Such emergencies qualify for disaster funding. However, the federal government intervenes only when asked by a province or territory to do so or when the emergency clearly lies within federal jurisdictions (EPC, 1997).

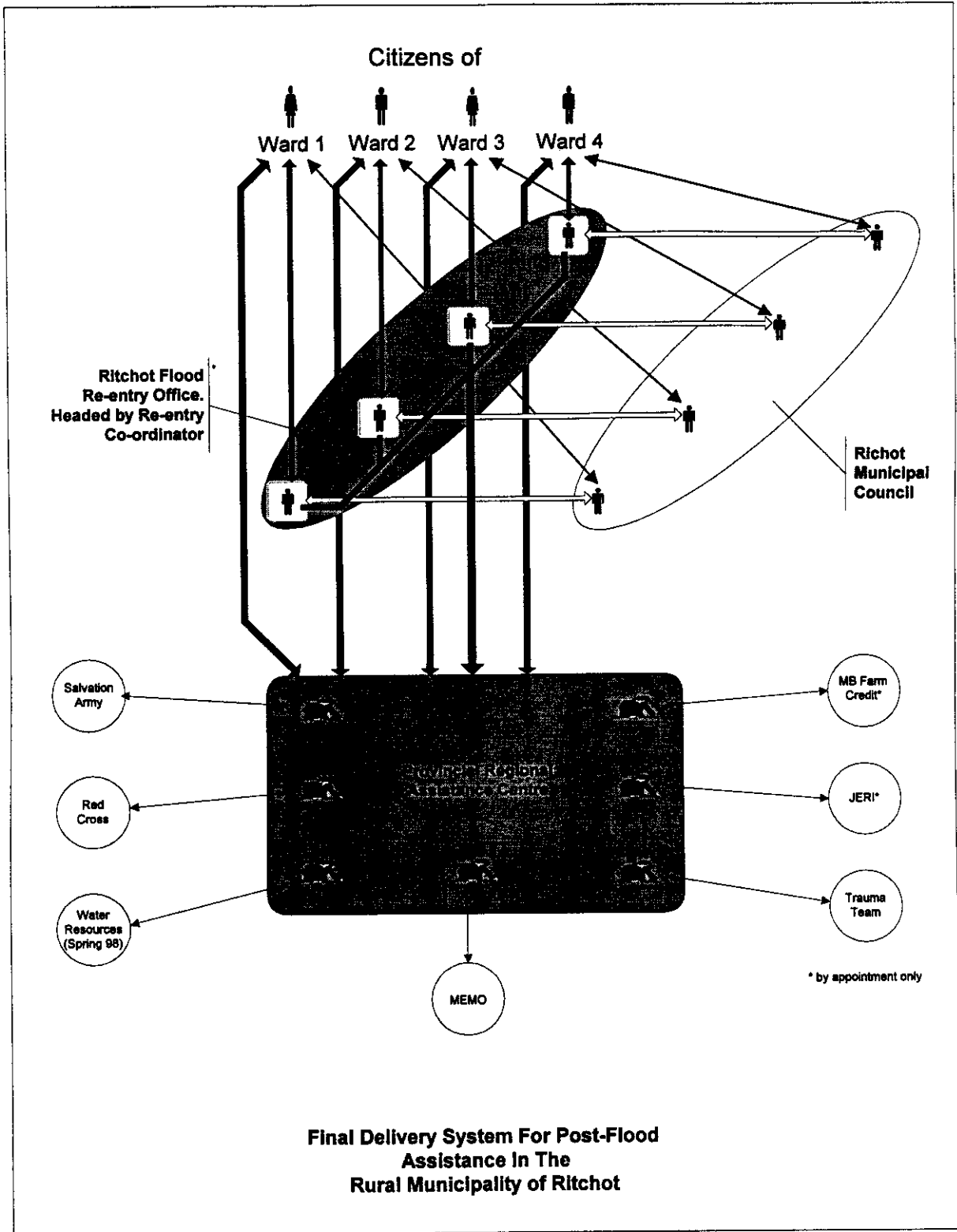


Figure 3. Final Delivery System for Assistance in R.M. Ritchot after the 1997 flood.

Emergency preparedness policies and programs are based on two pieces of federal legislation: (1) the 1988 Emergency Preparedness Act, which aims at effective civil emergency preparedness and cooperation between federal and provincial/territorial governments; and (2) the 1988 Emergencies Act, which empowers the federal government to provide safety and security to Canadians during national emergencies. A Federal Policy for Emergencies, established in 1980 and updated in 1995, outlines the development of civil emergency plans within the federal government. The policy guides the emergency planning and response of federal departments and agencies. It stresses collaboration among federal institutions, and between them and provincial/territorial authorities.

Manitoba's Emergency Measures Act, 1997, defines an emergency as a present or imminent situation or condition that requires prompt action to prevent or limit (a) the loss of life; or (b) harm or damage to the safety, health or welfare of people; or (c) damage to property or the environment. The Act also applies to a "disaster," which is defined as a calamity that has resulted or may result in (a) the loss of life; or (b) serious harm or damage to the safety, health or welfare of people; or (c) wide-spread damage to property or the environment.

The *Disaster and Financial Assistance Policy Guidelines, Province of Manitoba* indicate that disaster assistance funding is to be provided by the local authority unless such funding constitutes an unreasonable financial burden. Responsibility for emergency response thus rests first with the individual, and then with the local authority. The municipality authorities can manage local emergencies in most cases, but where they cannot, the provincial government can lend assistance. Similarly, the federal government would make available its resources when requested by a province. Funding assistance has an organizational and functional structure analogous to emergency response; that is, first responsibility is with the individual, then with the local authority, thereafter with higher level authorities.

Federal Disaster Assistance Funding

Emergency Preparedness Canada (EPC), acting for the Government of Canada, coordinates and facilitates emergency preparedness activities within and between federal departments and agencies and between federal and provincial governments. One of EPC's responsibilities is to administer the Disaster Financial Assistance Arrangements (DFAA) program. The program was established to help the provincial/territorial governments where "the cost of dealing with a disaster would place on undue burden on the provincial or territorial economy" (EPC Fact Sheet, 1997). Under DFAAs, the federal government provides, at the request of the province or territory, financial assistance in accordance with a formula based on provincial/territorial population.

When provincial expenditures exceed an amount equal to \$1 per capita for the province, the amount of federal assistance payable is as follows:

Provincial Eligible Expenditures (per capita)	Federal Share
First \$1	Nil
Next \$2	50%
Next \$2	75%
Remainder	90%

The representative of the federal government, usually the EPC regional director, arranges for damage assessment, damage claims, and interprets the guidelines and surveys. There are three categories of eligible costs: (1) expenditures during the immediate disaster period; (2) expenditures for post-disaster assistance for individuals; and (3) expenditures on post-disaster assistance for the public sector. Net costs are considered as eligible costs. Contributions made by agencies or that may result from a fundraising effort are to be subtracted from the total costs.

Ineligible costs include:

- damage costs recovered through insurance or law,
- provision of costs under other government programs,

- damage that is a normal risk of a trade or enterprise,
- non-essential restoration or rehabilitation,
- property owned by large business and industry,
- risk reduction construction,
- normal government operating budgets such as maintenance, and
- provincial taxes.

The Joint Emergency Preparedness Program provides another major financial mechanism through which the federal government cooperates with provincial governments. While the DFAA provides federal financial assistance after a province is affected significantly by disasters, the Joint Emergency Preparedness Program, administered by EPC, is designed to support projects related to providing uniform emergency response capability. This includes planning, training, and the procurement of emergency equipment. These projects are cost-shared by the federal, provincial, and local governments.

Provincial Disaster Assistance Funding in Manitoba

In Manitoba, disaster assistance is coordinated, administered, and delivered by the Manitoba Emergency Management Organization (MEMO) according to the provincial Disaster Financial Assistance Policy and Guidelines. The purpose of the Guidelines is "to assist small businesses, certain non-profit organizations and individuals financially when the eligible costs incurred resultant from a disaster exceed an amount that they may reasonably be expected to bear on their own." As these regulations and guidelines are expected to be consistent with federal guidelines, the provincial guidelines replicate the Federal Disaster Financial Assistance Arrangements in large part.

The cost-sharing formula used by the Province of Manitoba for public sector costs (presented below) incurred as a result of a disaster is adapted from the federal/provincial cost-sharing formula described above. Public sector costs and share arrangements in Manitoba are as follows (Government of Manitoba, 1997):

Municipal Eligible Expenditures (per capita)	Provincial Share	Municipal Share
\$0 to 1.00	0%	100%
\$1.01 to \$3.00	50%	50%
\$3.01 to \$5.00	75%	25%
\$5.01 plus	90%	10%

Eligible costs under the provincial disaster assistance program include, but are not restricted to, expenditures associated with rescue, transportation, health, food, shelter, and clothing. Livestock and valuable assets removal costs may also be included. Expenditures resulting from special security measures, communications facilities, emergency control headquarters, and special registration and inquiry services may be reimbursed to municipal governments. As with the federal programs for disaster assistance, the provincial programs do not include costs resulting from preventive projects designed to reduce the risk of disaster.

Eligible costs for individuals as post disaster assistance include the following:

- (1) restoration, to a pre-disaster condition or replacement to a depreciated value of, or repairs to, immovable real property, any normally occupied dwelling place, apartment buildings, green-houses and contents, farm buildings, and items essential to a farming operation;

- (2) restoration, replacement, or repairs to pre-disaster condition of chattels, furnishings and clothing of an essential nature; but shall not include items of a luxury or recreational nature;
- (3) assistance in the reestablishment of a small business where the owner's livelihood has been materially affected (including costs for restoration of farm lands to a workable condition where a farm operation has been seriously affected by flood erosion or land gouging);
- (4) costs of damage inspection; and
- (5) losses and damage to stored hay, feed, or grain.

Eligible financial claims can be made by an individual up to maximum of \$30,000, which is subject to a 20% deductible amount of approved costs. Nevertheless, the province/minister may waive all or a portion of the municipal, business, and/or individual's financial share of disaster costs. Notably, the maximum amount of disaster assistance claim for the 1997 Red River flood was increased to \$100,000, and the depreciation factor was removed from structural and essential household items.

Under the provincial Guidelines, businesses may submit claims for a maximum of \$30,000 of approved eligible costs. Such claims are subject to a 20% deductible (Government of Manitoba, 1997). It is worth noting that the Guidelines do not refer to any post-disaster assistance by government to large businesses or industry whose continued operation may be critical to the economy of a community. Such circumstances are covered under special study programs. The policy and guidelines further state that the province may waive all or any portion of the municipal, business, or individual's share of the disaster costs.

The 1997 Flood Proofing Program

To date, the federal and provincial governments have committed \$130 million to a Flood Proofing Program for Manitoba under an 50:50 cost sharing agreement. Negotiations are continuing on a possible additional \$70 million to be included in the program. The program has two components: one for individuals, the other for communities. Assistance for individuals, which includes homeowners, farms, and small businesses, is provided, up to a maximum of \$60,000, to raise foundations, construct dikes, or relocate to a protected community. Once a project has been approved, the work must be completed within five years. For individuals who are unable to secure commercial financing, loans will be made available through the Manitoba Agricultural Credit Corporation. As a further incentive, individuals who commit to an approved floodproofing project will have their 20% share of their disaster financial assistance claim waived (Manitoba Natural Resources, 1999). As of January 1999, about 800 homes had been protected under the program with another 3000 residences expected to be included over the next few years.

The other component of the program is to assist communities in the construction of protective ring dikes. Potentially more than 20 communities may participate, including Ste. Agathe and Grande Pointe. Decisions on construction will be contingent on environmental and engineering reviews. The cost sharing arrangements for construction costs are proportioned 45% for the federal government, 45% for the provincial government, and 10% for municipal governments.

Salient Features of the Disaster Assistance Programs

Analysis of these federal and provincial programs for disaster funding indicates that:

- disaster recovery needs are considered only in a *post facto* perspective,

- the need for interventions and financial assistance are determined in ascending order of governments: initially by the municipality, then by the province, and finally by the federal government;
- recovery of physical structures, community infrastructure, and businesses to pre-disaster conditions is identified as a public welfare concern and therefore is a programmatic criterion;
- in the public sector, municipalities are solely responsible for the first \$1 per capita of eligible costs, and the province assumes an increasingly larger proportion of eligible costs above this threshold;
- similarly, under the federal/ provincial cost-sharing formula, the federal share is nil up to the provincial eligible expenditure of \$1 per capita, and subsequently increases progressively with an increase in eligible expenditures per capita;
- the above implies that in relatively smaller disasters, the financial burden for ensuring safety and recovery is the responsibility of the local government; in moderate disasters they remain with the provincial government, and only in large events, does federal involvement occur; and
- disaster mitigation, such as floodproofing, has been assumed to be largely a public sector responsibility.

Expenditures on Disaster Assistance Programs

One of the duties of MEMO, as specified in The Emergency Measures Act (1996), is to deliver the disaster financial assistance (DFA) program. The magnitude of the program was established in federal-provincial agreements that were reached during the early stages of the flood.

Table 2 provides a summary of the claims made to the MEMO by individuals in the rural municipalities south of Winnipeg² as of February 5, 1999. The table indicates that the both the RM of Ritchot and the City of Winnipeg accounted for about 20% of the claims. However, Ritchot had the largest average per claim award and over 45% of the total dollars awarded. The data confirms that the impact of the flood was greatest in Ritchot. Moreover, only 59% of the claims from Ritchot have been settled, which is the lowest value in the table. Thus, almost two years after the flood, a large number of the residents of Ritchot have not completed their recovery based on the criteria used by the federal and provincial assistance programs.

In addition to the claims paid to individuals, MEMO distributed \$70 million to the municipalities according to the cost sharing agreements that were in place. The claim for Ritchot was approximately \$10 million. Half of this amount resulted from municipal claims resulting from recovery activities. Ritchot's proportion of the costs was absorbed by the RM's operating budget.

Federal and provincial support for the private sector was announced on May 16, 1997 as the Jobs and Economic Restoration Initiative (JERI). JERI, primarily administered through the Western Diversification Fund, had three components: a business recovery program (RESTART), a business resumption loan program, and an economic recovery program. RESTART began May 20, 1997 and provided accountable advances of up to \$5,000 to eligible small businesses (including farms and not-for-profit organizations) that had been directly affected by the flood. The program provided non-repayable assistance of up to \$100,000. By October 10, approved registrations numbered 2048 cases and 90% of the initial allocation of \$10 million had be assigned. The Business Resumption Loan program was announced on October 10, 1997 as a \$26 million cost sharing program of the federal

² The obtained data was not aggregated by sub-areas among the rural municipalities.

and provincial governments. The program provided interest free loans of up to \$100,000 with possible deferral of repayment for up to a year and a half. The term of the loan could extend to five years. The purpose of the program was to provide assistance for replacement of buildings and equipment where a difference existed between the replacement cost and the depreciated value as determined by MEMO. And finally, the other part of the October 10 announcement was the economic recovery program. It provided non-repayable assistance of up to \$50,000 to industry and cultural associations, chambers of commerce, tourism associations and other community based associations, and not-for-profit organizations. It was designed to finance reasonable costs for systemic projects involving broad-based regional/community/industry efforts directed at offsetting the economic impact of the flood. Expenditures from these programs were not obtained for the study area.

Additional financial resources for recovery activities came from other government programs and from nongovernment organizations. Unfortunately, the data were aggregated by the event and not by the regions in which services were provided. However, if the regional distribution is similar to that noted for the distribution for claims in the above table, then an approximate distribution of resources can be estimated. These estimates, along with the reported total value and primary purpose to which the funds were addressed, are provided in Table 3.

Table 2. Private Claims Awards per Rural Municipality South of Winnipeg as of February 5, 1999 (MEMO).

Rural Municipality	Award Dollars		% Total Award \$	Number of Claims	% Total Claims	% Claims Closed
	Total \$	Average \$				
De Salaberry	2,067,026	9,938	2.6	208	3.8	84
Franklin	1,655,213	12,171	2.1	136	2.5	75
Hanover	240,131	11,435	0.3	21	0.4	71
MacDonald	3,305,977	9,209	4.1	359	6.6	78
Montcalm	6,014,929	19,217	7.5	313	5.8	60
Morris	11,294,127	18,014	14.1	627	11.6	65
Morris (Town)	90,555	1,927	0.1	47	0.9	98
Rhineland	1,394,534	8,012	1.7	190	3.5	64
Ritchot	36,627,388	32,791	45.7	1117	20.6	59
Roseau River	1,281,997	8,012	1.6	160	2.9	99
Tache	1,406,201	7,211	1.8	195	3.6	84
Winnipeg	8,780,463	8,191	10.9	1072	19.7	87
Provincial Total	80,201,922	14,776		5428		75

Although it is not possible to disaggregate the information in the above table according to the regions that are the primary focus of the study, the responses to the interviews of representatives from the major sources of funding permitted a disaggregation according to the type of program the agency offered. These are presented in Table 4. The listed programs primarily addressed meeting the needs of individuals and helping them return to their pre-flood level of operation. To a lesser extent, the funds were used to support community activities with the intent of helping the community re-establish a sense of direction.

Table 3. Estimates of Additional Financial Resources for Recovery Activities.

Source	Amount ³	Estimate for Ritchot ⁴	Purpose
Western Diversification Fund	\$45,500,000	\$20,475,000	business and agriculture restoration, floodproofing, diking
Agriculture and Agrifood Canada	\$32,401,015 ⁵	\$14,580,456	crop insurance
Canadian Red Cross	\$26,000,000	\$11,700,000	humanitarian aid
Salvation Army ⁶	\$6,000,000 ⁷	\$2,742,000	humanitarian aid
Mennonite Disaster Services ⁸	\$1,500,000	\$685,500	humanitarian aid
Royal Canadian Mounted Police	\$619,000	\$278,550	damage; extra duties during flood and post flood period
Presbyterian Church in Canada	\$250,000	\$112,500	humanitarian aid
Evangelical Lutheran Church	\$238,754	\$107,439	direct disbursement to families/individuals
Anglican Church of Canada	\$104,289	\$46,930	humanitarian aid
City of Winnipeg	\$96,300	0	humanitarian aid
Adventist Development and Relief Agency, Canada	\$33,000 ⁹	\$14,850	humanitarian aid.

³ Based on information from EPC, March 1999 unless indicated otherwise.

⁴ Based on a distribution that parallels the individual claim data (i.e., 45.7% of the total distributed to Ritchot).

⁵ The value is primarily provincial crop insurance payments. Therefore, Ritchot's estimated portion is likely too high.

⁶ From Folkins, 1998.

⁷ Includes \$1.5 million of donation in kind from corporations including restaurant chains, airlines, bus lines, etc.

⁸ Friesen, 1999 interview

⁹ Does not include the 2200 staff and volunteers that provided direct assistance to affected people.

Table 4. Sources of Additional Financial Resources for Recovery Activities.

Organization	Program	Expenditure
Mennonite Disaster Service	Reconstruction of structures (grants, loans, gifts in kind) with a priority given to those with special needs (elderly, low income, disabled).	\$1,500,000
Canadian Red Cross	Provision of basic needs for those out of homes/jobs (until August 1997)	\$5,000,000
	Reconstruction assistance for homeowners ¹⁰	\$13,900,000
	Community development	\$900,000
	Support for trauma team & other Agencies	\$1,000,000
	Additional rebuilding costs	\$1,500,000
Salvation Army	Emergency Response - food preparation & distribution, clean-up supplies; volunteer & operation support.	\$362,997
	Flood Relief - food preparation & distribution, volunteer & operation support	\$213,179
	Community Reconstruction	
	- grants to individuals, communities, and agencies	\$2,425,795
	- counseling, volunteers, support personnel	\$328,091
	- facilities, food, supply and distribution of equipment and operation support	\$362,673
	Community Services - ongoing support of families to June 1999.	\$200,000
	Future Disaster Grants	\$500,000

Evaluation of Financial Assistance Programs

The financial assistance programs and the management systems installed to distribute and account for the funds have been previously reviewed by the Manitoba Water Commission. A summary of that review appears below.

According to the Manitoba Water Commission, the re-entry and recovery programs established by the Province were poorly managed. Reactive, rather than proactive, they suffered from lack of strategy, poor communication, shifting criteria for reimbursement, lack of coordination, and insensitive procedures. With respect to financial issues, the Water Commission indicated that:

¹⁰ As per the Province's criteria: \$6,000 for repairable damage; \$10,000 for irreparable damage.

. . . the original MEMO compensation program was very poorly communicated, causing confusion for flood victims and MEMO personnel alike. Confusion increased as teams representing other programs and organizations (Western Diversification, Red Cross, etc) toured the Valley, unprepared, practically unannounced and uncoordinated, offering assistance and services (p. 56).

Similar conclusions were reached in the independent internal review of the Manitoba Emergency Management Organization. The review concluded that the procedures were "not understood by the claimants" and that MEMO needed to have :

- better coordinated programs,
- proactively predefined compensation programs prior to floods,
- stronger communication,
- earlier implementation of programs,
- a reserve of trained resources (adjusters, inspectors and damage recorders) to administer the programs, and
- an information system to ensure equitable distribution of compensation.

Concerns about the provincial delivery of compensation programs were registered by the City of Winnipeg, the rural municipalities, reentry coordinators, and flood victims. But concerns were not just about the actions of MEMO. Problems were identified with the procedures for compensation used by the Red Cross, the Lion's Club, various church organizations, Manitoba Housing, Manitoba Agriculture Credit, the Jobs and Economic Restorative Initiative, and Water Resources. Problems identified include:

- poor communication of the conditions of compensation,
- changing conditions for the basis of compensation,
- poor communication about whether a program offered loans or compensation,
- insensitive interviewing processes,
- inability to assess unique circumstances in making asset determinations,
- redundant application information,
- excessive information required for relatively small amounts of money, and
- poor decision-making criteria.

Despite the numerous reports indicating that improved coordination of flood recovery programs is needed, the problems persist. In the continuing floodproofing programs, victims are still caught in inter-agency squabbles about who pays for which part of floodproofing activities. Decisions on buyouts of properties that are at risk of future flooding or riverbank erosion are awaited. While most victims have returned to their homes, financial uncertainty remains a key issue for them.

Structural Assistance

The recovery phase happened in two stages, with the stages corresponding to the two different financial assistance programs of the senior levels of government. In the first stage, rebuilding to pre-flood standards occurred; in the second stage, floodproofing, as defined by the province, occurred. Often the two occurred together. But some homeowners found themselves doing it in stages because of the uncertainty of the financing. A subset of these found that it was necessary to redo earlier work as they attempted to floodproof after they had rebuilt.

Once the conditions for reentry¹¹ had been met, homeowners and communities faced the dual tasks of cleaning up flood debris and damage, and rebuilding their homes and other structures. MEMO, the City of Winnipeg, and the Mennonite Disaster Services engaged in an active program of public education. Pamphlets were prepared on a variety of topics related to financial assistance, cleaning, health, mold¹², water quality, septic field problems, utilities, social services, regulations, contact people for additional information, and stress counselling hot lines. The pamphlets were distributed to municipalities and to homeowners.

On August 5, 1997, the Red Cross announced *Operation Homecoming* to help people begin rebuilding. For those whose homes were unsalvageable¹³, the Red Cross provided a \$10,000 grant to defray rebuilding costs. For people whose homes needed major repairs to become habitable (estimated to be 650 homes at that time), the Red Cross provided a grant of \$6,000. For both groups, there existed the possibility of additional funds based on their subsequent needs. The intent was to provide the funds within three weeks of the MEMO assessment of the status of the domicile.

During the recovery period, the Salvation Army's mobile canteens¹⁴ provided hot meals for volunteers working at cleaning and reconstruction. The canteen operators often became emotional lightning rods for the residents, giving them an opportunity to talk about their plights and problems, and at the same time to receive emotional support and comfort. The Salvation Army also distributed clothing, food and household items. Under Operation We Care, the Army provided funding assistance nominally for the replacement of furniture and household items. People whose homes were unsalvageable received \$2,500; people whose homes suffered extensive structural damage received \$1,250. And finally, the Salvation Army arranged transportation for volunteers so that they could enter the work areas from their Winnipeg staging areas.

The Mennonite Disaster Services were very active during the rebuilding phase, starting with clean-up assistance in May 1997, damage assessment (with a needs component) in June 1997, and rebuilding assistance up to the present time. In addition to the financial assistance noted earlier, Mennonite Disaster Services provided technical assistance to homeowners. This involved mediating between contractors and homeowners, project management, and volunteer activity by skilled workers to rebuild homes. The assistance was provided either on site or through telephone consultations.

Floodproofing

In initiating its floodproofing program (criteria listed in the box, below), the provincial government chose rebuilding and new building standards (Manitoba Natural Resources, 1999) at the level of the 1997 flood plus two feet (97+2). Thus to qualify for floodproofing assistance, both homeowners and rural municipalities had to choose procedures that would hold back water to these levels. However, for those unable to meet such criteria, few options were made available, even though the Interim Report of the Manitoba Water Commission recommended a broader approach. The federal and provincial governments have proposed the creation of a co-funded buyout program as a measure of last resort. This program would apply to those cases for which floodproofing measures are technically not possible or too expensive. It would be run by Agriculture and Agri-Food Canada and could apply to up to 200 properties in the valley. There would be a cap on the amount of individual

¹¹ Established by MEMO for the rural municipalities and checked by municipality and provincial officials before reentry was authorized. A similar process was followed by the City of Winnipeg.

¹² The potential for mold problems did not appear to be fully appreciated. Several structures were rebuilt only to later discover that mold had developed behind the repairs. This required that the work be redone after the mold had been eradicated. Mold became a major issue during the latter part of the recovery stage. MEMO (as of February 5, 1999) has had 740 mold claims, which resulted in 261 awards with 63 files still active. Thirty-five properties were considered unsalvageable because of mold.

¹³ Originally estimated to be 100 homes by MEMO. To February 5, 1999, the number of unsalvageable homes is 254.

¹⁴ By September 30, 1998, the mobile canteens had travelled over 127,000 km, served over 94,000 meals, and had more than 160,000 people visit them.

MINIMUM CRITERIA FOR FLOOD DAMAGE REDUCTION CONSTRUCTION

- **House with a basement:** main floor equal to the 1997 level plus 3 feet; fill elevation equal to the 1997 level plus 2 feet.
- **House without a basement:** main floor equal to the 1997 level plus 2 feet; fill elevation at the 1997 level plus 1 foot.
- **House raised on posts or piles:** main floor equal to the 1997 level plus 5 feet; finished grade at the foundation not lower than 3.5 feet below the 1997 level.
- **Ring dikes:** 1997 level plus two feet.
- **Attached garages:** floor elevation equal to the 1997 level plus 1 foot; fill at the 1997 level.
- **Detached garages:** floor may be up to 3 feet below the 1997 level, but the structure should be waterproof up to the 1997 level.

Manitoba Regulation 266/90 (Water Resources Branch, June 17, 1997).

buyouts (probably on the order of \$200,000) with a deductible of about 10%. As of May 1999, however, this proposed program had not been approved.

For the communities in the rural municipality, the only option was to construct dikes or to raise the existing dikes (e.g., St. Adolphe). Responsibility for the incurred costs of construction and subsequent costs of dike maintenance are the focus of discussions between the provincial government and the municipal governments. Ste. Agathe is scheduled for dike construction, while there is an ongoing discussion about providing a dike around Grande Pointe. The Ste. Agathe dike will not be a large structure—we were informed that current estimates call for a three-foot dike—but it has required the expropriation of 12 homes, many of them flood damaged. Design of the dike is a collaborative exercise involving an architect selected by the community, the Rural Municipality, and the provincial departments of Natural Resources and the Department of Highways. The design is well under way and will be submitted for provincial approval in due course. Details on a dike for Grande Pointe have not been accessed.

For a homeowner, floodproofing typically meant employing one of two procedures: either surround buildings with a ring dike built to the required level, or construct a mound to this height and then place the domicile on top of it. Parenthetically, a third strategy was used by at least one resident of the rural municipality. That strategy involved raising the house on stilts to the required level. As this was an atypical response, further discussion of the approach will not be pursued. And finally, a small number of homeowners chose to relocate to protected communities. As these homeowners were not in the primary study area, a detailed examination of this option was not included.

Not all homeowners adopted these strategies. Some had reconstructed their homes before the declaration of the floodproofing criteria. Some did not own sufficient property to use the strategies. And for others, the topography of their property constrained the availability of options, or they lacked the financial resources to initiate such actions. And finally, there were homeowners who were successful in defending their homes from the flood. Because they did not suffer damage, they were not eligible for floodproofing funds.

Whether a dike or a mound was the action of choice was related to several considerations. These included cost, speed with which the work could be completed, impact on how quickly the home could be re-occupied, the impact on the building site, and the impact on the sense of security of the residents. Both strategies have drawbacks—some of which only became apparent to the residents after the completion of the structure. Drawbacks noted are listed below.

For ring dikes,

- construction quality (were all contractors knowledgeable about the construction processes needed?),
- visually unappealing on small properties,
- destruction of view from the home,
- creates a bowl that increases snow drifting around the house in the winter and water retention during spring thaw and heavy summer rains,
- difficult to maintain,
- settling problems may occur that will result in a lower net height,
- wind and water erosion can result unless the dike is protected by appropriate landscaping, and
- claustrophobic sensations reported by some residents on small properties.

For mound construction, the concerns were:

- the quality of construction,
- difficult to maintain,
- settling problems may occur that will result in a lower net height,
- differential settling across the mound could lead to structural damage,
- wind and water erosion can result unless the mound is protected by appropriate landscaping,
- winter access to the property because of the steepness of driveways that could prevent access by service and emergency vehicles,
- impact of the mound on water movement and height on neighboring properties,
- designs that do not permit, either through lack of space or the gradient of the mound's slopes, the construction of a sandbag dike around the buildings on top of the mound.

In addition, where the mounds were constructed from material from the property (i.e., the creation of borrow pits), there were additional concerns:

- safety of the pits, particularly for small children,
- construction of the pits, in that the pit walls may be too steep to be stable, leading to future collapse of the edges and possible intrusion onto the property of others,
- proper landscaping of the pits,
- water retention in the pits and the subsequent growth of toxic algae,
- the visual blight produced by a scoured landscape, and
- ability to properly maintain the pits.

Other homeowner concerns were:

- septic fields and holding tanks,
- water sources; not all wells are useable because of pollution of the aquifer.
- no policy concerning buyout of properties that contain buildings that may be at risk
- river bank stability; property owners along rivers and ravines allowed to reconstruct without a determination of the stability of the banks being done. Banks have collapsed in places, sometimes a year after the flood. In one case, the collapse occurred just before the beginning of reconstruction of a flooded home.

Insurance

At the time of the flood, flood insurance for homeowners was not available. Thus, insurance claims by homeowners were restricted to problems resulting from sewer back-up. While this occurred in the City of Winnipeg, there were few instances in the study area where sewer back-up preceded basement flooding.

Since the flood, Lloyd's of London has offered flood insurance in Manitoba's Red River valley. To qualify for the insurance, residents must be floodproofed to a level of 1997 plus 2 feet and the method of floodproofing must involve building a mound. Coverage is available for up to \$50,000 with a \$5,000 deductible. Annual fees range from \$700-1800. As of January 1999, nine policies had been issued. This number is low considering the interest in insurance expressed immediately after the flood. It was believed that the high premiums and the increasing availability of ring dikes were the principle disincentives to purchasing policies.

Unlike for homeowners, the insurance policies of the City, the RM, and many commercial operations did cover flood damage. For example, the school in Ste Agathe, which received considerable flood damage, was reconstructed primarily through insurance funds. The School Board simply had to pay the deductible, most of which was subsequently covered by DFA.

However, it is not possible to determine the scope of the commercial insurance coverage or the costs that insurance companies paid out without an extensive study directed at these issues. According to the Institute of Catastrophic Loss Reduction, the insurance industry in the valley is composed of a large number of small companies and it has not been possible for the Institute to accurately determine the cost of the flood to the insurers.

Social Assistance

Social assistance includes all kinds of support given or received to recover the "basic needs" and to maintain the welfare of the people. In the context of this project, such social assistance would include support given only for recovery, and therefore, would exclude emergency food, shelter, clothing, health care, and other services. In Manitoba, "social assistance," as defined by the provincial government, is included in the 1994 Social Services Administration Act. In the Act, social assistance means "aid in any form to or in respect of a person in need for the purpose of providing or providing to or in respect of such a person (a) food, shelter, clothing, fuel, utilities, household supplies and personal requirements, (b) prescribed items incidental to the carrying on of a trade or other employment and other prescribed special needs of any kind, (c) care in a home for special care, (d) travel and transportation, (e) funerals and burials, (f) health care services (other than those provided under the Health Services Insurance Act), (g) prescribed social services provided or purchased by or on the request of the minister or a person or agency authorized by the minister, and (h) comfort allowances and other prescribed needs of residents or patients in prescribed institutions, which provide in addition to or independent of social allowance, and whether the person to whom it is provided is a recipient of social allowance." As this research project concerns only aspects of recovery assistance, emergency items such as (a), (d) and (e) can be excluded. Item (h) should also be excluded from social assistance and be considered under financial assistance.

During and after an emergency, Manitoba Emergency Social Services of the Department of Family Services is the lead department in providing social assistance. The Service provides food, clothing, shelter, personal services, clean up, and building repair advice and assistance, reception centres, and administration (registration and inquiries) for its services. The Services have Memoranda of Understanding with key nongovernment agencies, such as the Red Cross, Salvation Army, Mennonite Disaster Services, Manitoba Hotel Association, and the Manitoba Restaurant and Food Services Association. to augment its capacities during emergencies. Manitoba Social Services, along with some of the support agencies, sits on the Flood Recovery Committee, MEMO's coordinating committee for flood recovery. Concerns about the function of this Committee have been registered above and will not be reiterated here. However, it is important to note that the inclusion of all parties on the Committee, both at the provincial and the municipal level was viewed by the nongovernment organization and municipal officials as a major benefit because it helped reduce redundancies in program delivery, provided vehicles for more rapid problem solving and dispute resolution, and facilitated the development of multi-agency programs.

Temporary Housing

Recognizing the need to house temporarily those whose homes were damaged by the flood, MEMO issued guidelines for eligibility for temporary accommodations on May 10, 1997. Essentially the guidelines allowed people to have continued evacuee status until they could return to and live in their homes, until they made the decision not to rebuild or repair their house, or until they found permanent alternative accommodation. Declaration of evacuee status required registration with local authorities and concurrence by the rural municipality, town, or city¹⁵ that the person met the conditions for evacuee status. The local authority was to identify the needs of individuals and families, assist with locating and establishing temporary accommodations, and reimburse the family for the costs of renting the accommodation. The Province reimbursed the local authorities for these costs. The guidelines also contained maximum refundable costs for a variety of different rental arrangements. These were as follows:

- M.H.A and C.M.H.C. apartments: as per their rate guidelines,
- other housing and apartment rentals: \$800/mon maximum,
- arrangements with relatives: \$400/mon maximum,
- mobile home-base unit: \$1800/mon maximum, plus one time allocation for service hook up (\$300), holding tanks (\$750), insurance (\$500), and winterizing (\$600), and
- recreational trailers-basic unit: \$2000/mon maximum, plus a one time allocation for incidentals (\$800).

The demand for temporary housing and how that demand changed over time in the study area have been discussed above.

Basic Needs

To support flood survivors during recovery, the Red Cross announced on May 16, 1997, a program for the distribution of the donations that it had received. The program was designed to provide assistance for income loss during and after the flood. Disbursements were intended to meet immediate basic needs such as mortgage payments, rent, loss due to flooding of necessities such as food and clothing, and income replacement for those who had loss income because of the flood. The amount awarded depended not on the actual income lost, but on the needs that were going unmet because of the loss. As need varied with the circumstances of the individual, the level of assistance was not fixed, but determined on an individual basis. The total distributed by the program exceed \$5 million. While originally conceived as a one-time disbursement, the extended period of the recovery phase necessitated multiple payments to some people. On August 5, 1998, the program was renewed with an infusion of an additional \$3.75 million and expanded to deal with emerging concerns such as problems with mold and floodproofing.

Social and Health Needs

Physical health was not a major problem during the initial recovery period. Mold-related health problems emerged later and are being dealt with through normal channels. Psychological problems, however, were epidemic among flood victims. The stress associated with the activities during the pre-flood, flood, and post-flood periods manifested itself in a variety of ways. The next

¹⁵ The City of Winnipeg actively participated in this program through it Emergency Social Service unit in the City's Social Service Department. The City found temporary housing for a small number of people who were unable to return to their homes once reentry was permitted. The City also assigned two social workers per family to assist with physical and social well-being, and advocacy for service, and where necessary referral for counselling.

section identifies some of the psychosocial impacts during the period. It is followed by a description of the response to the emerging problems resulting from the stresses of the experiences.

Psychosocial Impacts of the Flood

In the fall of 1997, Morris-Oswald and Simonovic (1997) conducted a small sample survey to assess the psychosocial impacts of the flood and the recovery process. Individuals sampled included people from Grande Point, Ste. Agathe, and St. Norbert. The survey had two major components. The first identified major stressors identified by the communities; the second detailed the consequences of the stressors for the respondents.

For the immediate post-flood period, the major stressors were:

- lack of information about resources (returning evacuees did not know what services they were entitled to; what services they would need; how they could access the services),
- lack of information about health concerns (MEMO assessors appeared to lack knowledge about potential health problems; dissemination of information was slow and uneven),
- inadequate claims process (compensation system confusing, lacked transparency, and failed to be coordinated among the various institutions (e.g., MEMO, banks, credit unions) involved in financing recovery efforts),
- barrier between city residents and rural victims (disparate experiences of the flood and its impact led to opposing perceptions and conceptions of the event).

For respondents who suffered flood damage, the effects of the post-flood stressors were seen as increases in high stress, lack of sleep, depression (over 70% of the sample), irritability (80%), and difficulty in coping with problems (100%). This last measure was substantially higher than reported for the flood period. For respondents who were evacuated and suffered no flood damage, the effects were milder in that lower proportions reported increases in behavioral problems (less than 20% reported increases in loss of sleep and depression, about 30% were more irritable, and less than 60% noted high stress and problems in coping with problems. Comparing the two classes of respondents showed that those suffering flood damage had a greater sense of loss of control that, unlike that of the evacuees, did not recover post-flood; a greater sense of confusion; and were much angrier with sense of anger increasing in the post-flood period.

In discussions with officials in the area, it was indicated that many of these reactions have persisted to the present time. While the intensity of reactions may have diminished, coping, depression, loss of control, and anger are still present. Moreover, some residents are regretting their initial decision during the early stages of the recovery stage. Rebuilding instead of selling; putting up a ring dike instead of a mound and now feel like they are living in a prison rather than a home.

Emotional flatness persists. People indicated they are not as effective as they were before the flood, even though they have restored their homes and way of life. Those that have still not fully rebuilt, have stronger reactions—depression and hopelessness.

For many, their way of life has been permanently disrupted; their plans for the future dramatically altered. Retirement plans have been abandoned because of massive increase to liabilities; financial worries for the elderly have been exacerbated because their pensions have been eroded by the cost of recovery.

Trauma Team

The Trauma Team was established as a joint program of Manitoba Health and the Red Cross¹⁶ on July 15, 1997. Its formation was a reaction to the identification of serious psychosocial

¹⁶ The Red Cross initially contributed \$160,000 to the operation. In February 1998, it committed another \$55,000 to the project.

problems in the rural municipalities. Winnipeg crisis lines were being inundated by rural calls, an appeal to the legislature for emotional help and requests to Manitoba Health for assistance led first to a needs assessment study and then the formation of the Trauma Team. The Team began with debriefing RM employees in August and has continued other activities into the current year.

The Trauma Team developed activities under four major themes: counselling and debriefing, information dissemination, stress reduction and emotional support, and family and community building. The first two themes were primarily directed to the officials working in the flood area. The first theme was directed at helping the workers understand their experiences and to provide emotional support. The second theme's aim was to provide officials with information related to psychosocial problems so that the officials would be in a better position to understand the interactions they, and their clients were experiencing.

The third and fourth themes were directed to residents. Activities under the third theme were designed to reduce the likelihood of the residents developing serious psychological problems, such as post-traumatic stress disorder. The Trauma Team was proactive in these activities, going to the homes of all residents who had been adversely affected by the flood. The goals for the visits were to assist normalization of feelings, review and augment coping strategies, and to offer support and encouragement. Members of the trauma team felt their contributions were constructive and beneficial to residents. Officials in the rural municipality concurred. Under the fourth theme, the Trauma Team worked with leaders in the community to offer a variety of activities designed to restore community cohesiveness by working with different groups within the community (e.g., senior luncheons, September picnic, fall supper, Christmas parties, sleigh rides, Christmas hampers, children's camps, anniversary picnic) and by taking groups away from the flood zone for special activities (e.g., retreats for various groups, day trips for students). Major funding of many of these programs were provided by the Red Cross and Salvation Army (see below).

The activities of the Trauma Team were generally appreciated. Nonetheless, severe psychological problems persist. Several interviewees noted that the Team's activities should have started sooner, particularly those programs directed at assisting people to cope with their experiences. There was also a concern expressed that the members of the Trauma Team did not bring equivalent experience and skills to the situation, to the detriment of their clients. It is hoped that an independent review of the activities of the Trauma Team will focus on the needs of the clients and the skills needed to meet the needs in an effort to improve a concept that, overall, assisted many people with their adjustments to life after the flood.

Community Building

Both the Red Cross and the Salvation Army identified the need to participate in community building as a major component of recovery activity. The scale and magnitude of the devastation resulting from the flood seriously damaged societal functioning in the areas.

On February 9, 1998, the Red Cross announced its Community Development Program. The program contained \$1 million for projects that would improve the quality of life in flood affected communities. By this, the Red Cross meant that an approved project should improve the general well-being of a community through the creation, re-establishment, or strengthening of community support programs that would increase the community's self-sufficiency and sense of community. While project needs might be identified by the Trauma Team, application to the fund, which limited any given program to a maximum grant of \$20,000 had to come from the community. The deadline for the program was May 31, 1998.

The Salvation Army's program Operation We Care had two goals: to fund community projects that focused on community activities, and to fund activities that increased social interactions. Projects funded under community projects included:

- a new playground structure and a basketball court at Ste. Agathe School,
- furnishings for a Community Hall for Wards 1 and 4 (Taras Shevchenko Hall),

- reconstruction and restoration of Ste. Agathe Park (with the Manitoba Economic Development Council),
- financial support for other agencies involved in recovery (e.g., feeding volunteers of Mennonite Disaster Services programs), and
- the Community Conversations in Ritchot (see below).

Under social activities, the Salvation Army funded:

- a community dinner for Grande Pointe,
- a computer camp for children at St. Adolphe school,
- marriage enrichment retreats,
- a teens retreat to Camp Woodlands,
- Monthly senior luncheons for Grande Point, Red River Drive, St. Adolphe,
- youth activities during spring break, 1998,
- a day camp for young people Camp Ritchot (with Rotary Clubs, Manitoba Culture and Heritage), and
- "Flood of the Century" anniversary events in Ste. Agathe, Grande Pointe and other areas of the valley.

Emergent Organizations

Often during and immediately after emergencies, organizations emerge that can work with or opposed to the formal emergency management system. How the informal and formal systems work together often determines how effective the recovery process occurs.

After the flood, several such organizations appeared in the study area. In Grande Pointe, residents worked together to determine the cause of their flooding, to seek adequate compensation for it, and to work towards preventing future flooding. Consultants were hired and a case presented to the government that the flooding in the area was exacerbated by the Province's operation of the Floodway gates. In its final report, the Manitoba Water Commission, while reaching a different opinion on the degree of the contribution, concurred with this position. In response to the conclusions and recommendations of the Water Commission, the government increased its contribution to floodproofing and assistance to the affected areas. It was estimated that about 1100 homes and businesses would benefit by this action.

In Ste. Agathe, the Ste. Agathe Community Development Committee, which was formed to generate a development plan for the community, changed its focus. It became the collective voice of the town, advocating for the services needed for a rapid recovery. Working with the RM and provincial agencies, the Committee assisted the re-entry coordinator in identifying community needs and then advocated for obtaining the resources needed to satisfy the needs.

In Wards 1 and 4 in North Ritchot (which includes Grande Pointe), the North Ritchot Restoration Committee was formed. Funding, jointly provided by the United Church of Canada and the Red Cross was used to hire a Committee coordinator, build community bulletin boards, establish a newsletter and hold community meetings. The Committee was a conduit of information: bringing information about programs, regulations, potential problems that needed to be avoided into the community; and taking the community's concerns and needs to appropriate agencies for advice and consultations. For example, the Committee, on hearing of the potential for mold problems and the health risks that it posed at the FloodNet meeting, actively pursued information about mold and disseminated it throughout the community. The Committee addressed all issues related to recovery: the availability of compensation resources; technical information on issues like restoring septic fields and water testing; and, social activities designed to provide psychological relief to flood victims.

And finally, in September 1998, a Community Conversation began in the RM of Ritchot. Funded primarily by the Red Cross and the Salvation Army, organized by concerned citizens and the Reeve, modelled on the approach of the North Dakota Consensus Council, the goal of the Conversations was to help the community identify, to build agreement on, and to implement a

sustainable "Community Agenda for the Future" that "outlines appropriate short and long-term economic, social and environmental strategies." Community meetings were held throughout the RM. At these meetings, the attendees identified the treasures of the RM that needed to be preserved, things at risk and their recommendations for the future. Next, the group identified possible actions that would satisfy the recommendations and who would be responsible for implementing the actions. The organizing committee integrated the responses from the meetings and then, on November 29, 1998, held a community supper at which attendees voted for those actions deemed to be their highest priorities. A report on the outcome of this process is due soon. The next step will be to develop indices to track the implementation of the priority goals and to initiate appropriate actions needed to progress towards the goals.

Over 2000 individuals participated in the process. It seemed to catalyze a sense of togetherness and hope and to provide a sense of direction to a severely traumatized community.

Parenthetically, it should be noted that the RM of Ritchot differed from the other RMs in its organization for the recovery. First, the RM adopted a management structure that was designed to make it as easy as possible for its residents to recover from the impacts of the flood. Consistent with this structure, the RM, with the other RMs, advocated user-friendly changes to the provincial approach to post-flood assistance. Second, Ritchot was the only RM that undertook a Community Conversation with its focus on community involvement and discussion. Whether the process will meet its objective is as yet unclear. However, the participatory process provided a forum for a discussion of concerns and fears. Moreover, it generating a sense of control of the future - a sense lost in the devastation of the flood.

V. ANALYSIS OF RECOVERY ASSISTANCE IN CONTRIBUTING TO LONG-TERM FLOOD RESILIENCE

Determining how recovery assistance can help build flood-resilient communities in the Red River Basin necessitates limited exploration of the concept of resilience. This section looks at the broader concepts that frame flood resilience in various dimensions, that is, (1) flood resilience defined, (2) ways of measuring resilience, and (3) the relationship between recovery assistance and resilience.

What is Resilience?

Resilience is the ability to change and rehabilitate a system to a sustainable and persistent order. In relation to natural disasters, it is the quality of being able to 'bounce back' quickly from an extreme natural event—a flood—without permanent, intolerable damage to, or disruption in, social, structural, economic, or biophysical systems, and without large amounts of outside assistance.

Flood resilience implies a flexibility to flood hazards that is brought about through a combination of strategies appropriate for the specific situation. Among these strategies are:

- avoidance of disruption and damage from floods or minimization of such disruption and damage, when avoidance is not possible;
- successful coping with disruption and damage that does occur; and
- a return to normal functioning that is as rapid as possible.

Many possible activities, techniques, and measures can be employed to promote flood resilience. Warnings, flood control measures, maintenance of flood-prone areas as open spaces, property insurance against flood damage, installation of flood-resistant construction, and management of stormwater all are included. Virtually any mitigation action that reduces future flood losses or impacts can contribute to flood resilience. When these activities, techniques, and measures are comprehensively combined for a specified area, e.g., a community or river basin, and when they do not detract from the other precepts of sustainable development described below, then the area can be termed 'flood resilient.'

The process of managing flood hazards and floodplains is complex and entails the identification of risks and specific elements that are at risk, analysis of the vulnerabilities posed by risks and development of strategies for dealing with them, and implementing public and private programs to prevent and/or cope with the likely losses. This process becomes more complex when one recognizes that floods, of course, are just one aspect of the natural environment within which they occur. In the same way, human activities that increase or decrease flood risk are part of larger social, economic, and cultural systems. This is illustrated by the fact that many of the precepts of sustainable development, as defined by the 1987 World Commission on Environment and Development, relate to floodplain management and flood resilience. These precepts include:

- fostering local resilience to disasters,
- maintaining environmental quality,
- ensuring quality of life for humans,
- seeking intra- and inter-generational equity,
- working for vital local economies, and
- using local participatory decisionmaking.

(The reader may wish to see Mileti (1999) for a discussion of the integration of disaster resilience with sustainability.) Activities that strengthen a community's overall social, economic, and

environmental sustainability in most instances also contribute to its disaster resilience, and vice versa. Thus, working towards sustainable communities (and, eventually, regions, nations, and the world) goes hand in hand with working towards maximizing resilience to disasters.

The President's Long-term Recovery Task Force, established in the wake of the Red River flood of 1997, lists components for a sustainable Red River Basin that are similar to the sustainability precepts described above: 1) a healthy environment, 2) a vital workforce, 3) a vital economic base, 4) sound infrastructure, and 5) adequate housing. Making that 'sustainable Red River Basin' into a flood-resilient Red River Basin involves ensuring that every possible element of these components can withstand, and quickly recover from, a future flood. Some of the elements of a disaster-resilient, sustainable river basin are included in Figure 4.

For example, a flood-resilient river basin could be one in which there are riparian areas in natural or restored condition. Flood-induced pollution has been prevented and the river channel has not been paved. Runoff is infiltrated or reaches drainage ways in an appropriate manner and habitat is preserved as natural storage areas. Flood-resilient infrastructure and housing translate to a minimum number of buildings at risk. Infrastructure and critical facilities are resilient to flood damage by virtue of location, floodproofing, or other techniques. Flood-resilient residents, essential to providing a vital

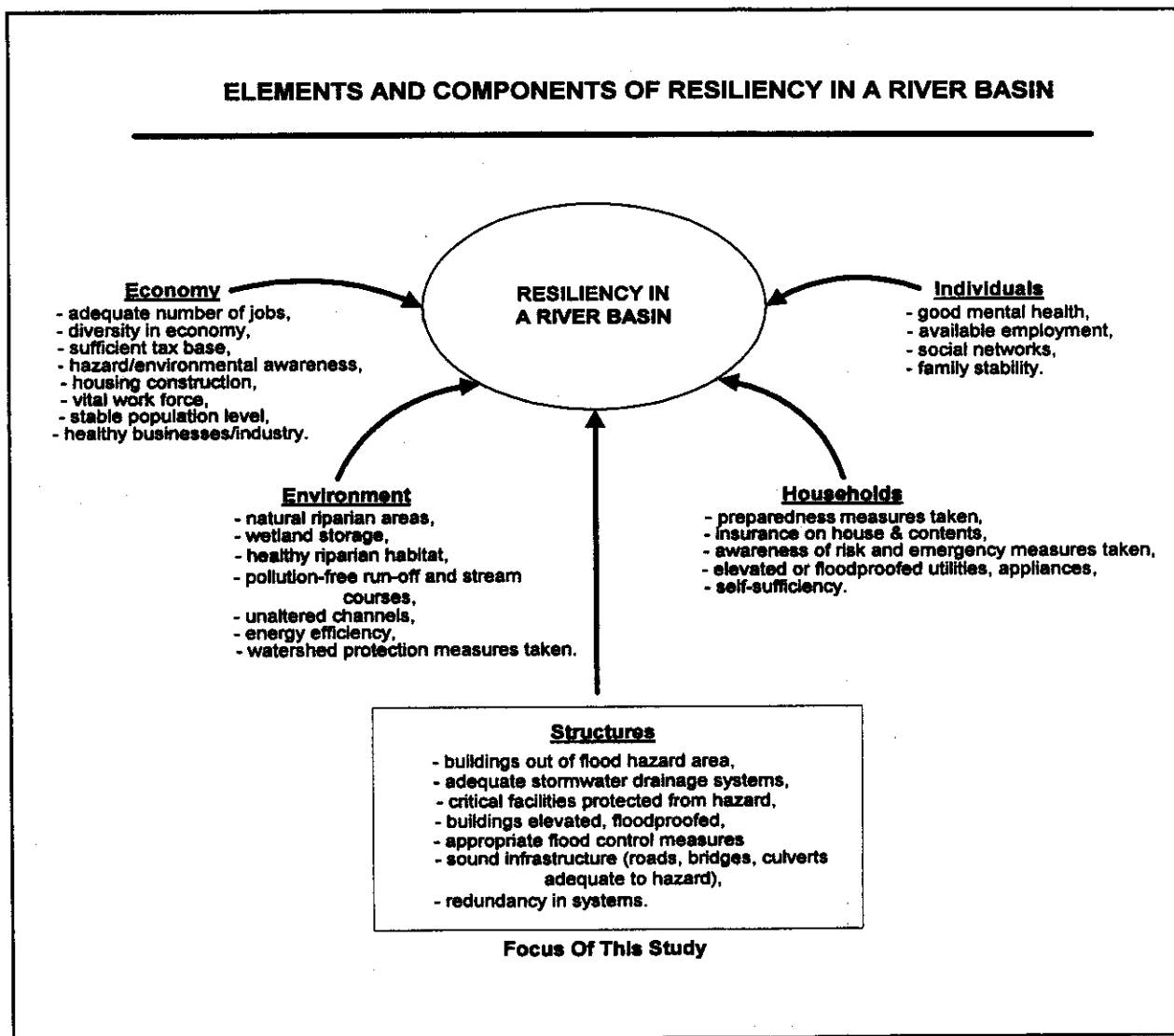


Figure 4. Elements and Components of Resilience in a River Basin.

workforce, are those that understand and have adopted acceptable levels of risk, are adequately insured, and know what to do when flood threatens. A flood-resilient economy requires that local business premises are not at direct risk from flood waters and that the economy is sufficiently diversified so that not all the local business is destroyed. Of course there would be interactions among all these components that could add to or detract from resilience.

Measuring Resilience

In order to assess and strengthen basin and community resilience, it is essential to identify characteristic elements of flood resilience. One effective way of identifying those elements is to parallel the categories used to inventory flood impacts. For example, impacts are often expressed as number of people evacuated; damaged residential structures; numbers of deaths and injuries; weeks of business interruption or dollar cost of local business; rates of unemployment; days of disruption to transportation; dollar damage to public infrastructure; quantity of soil eroded; acreage of lost habitat; and changes in rates of suicide and divorce. With this approach, achieving a resilience measurement results from the adoption of one or more of these loss categories, in a temporal framework, as a category of resilience. In other words, a decrease in present and future losses represents an increase in resilience. For some categories, future losses can only be projections, but for others there is solid evidence, based on past floods, of certain actions and measures that have, and can, reduce losses and promote resilience.

The measure of resilience, then, would be different for each category. For some categories hard numbers might be obtainable and useful (number of households exposed to a certain level of risk, or number of acres of natural flood storage capacity). For others, a qualitative assessment may be all that is possible.

Recovery Assistance and Resilience

Both Canada and the United States have programs and policies to assist localities and individuals during the period of recovery after a major flood. In an ideal world, that recovery period should be a time to focus attention on advancing flood resilience. Influx of additional funds into flooded localities, technical assistance, various types of additional expertise, and political attention all combine to make the post-flood period one in which many things temporarily become possible that would otherwise be out of reach. An excellent opportunity to advance flood resilience, instead of returning to the status quo, resides in this post-flood recovery period. Governments of both countries can improve resilience in the Red River Basin by ensuring that recovery policies and programs foster ability to adapt to change and recover in a way that is sustainable.

This project analyzed one category of resilience—that of structures, including residences, commercial/business buildings, public facilities, and infrastructure such as roads, bridges, and treatment plants. This category was selected for several reasons. First, damage to structures accounts for a good deal of the losses during a flood. Second, the number of structures and their degree of risk are a key indicator of the occupancy of floodplain areas—a perennial issue in floodplain management. Third, it was thought that data on structures would be more easily obtainable than that on some of the other categories of resilience. And fourth, structures are the target of many forms of recovery assistance. The specific technique used to assess the resilience of structures is described below.

It is important to note that this is not an evaluation of any one program for recovery assistance, nor is it a commentary on any agency's policies or implementation practices. Rather, it is a simple way of examining, in general, the extent to which various streams of assistance for structures did or did not foster various means of either reducing future flood losses to one dimension of human occupancy of the floodplain (buildings and other structures) or enhancing other aspects of resilience in the Red River Basin.

To analyze whether recovery assistance influenced flood resilience by its effects on the structures affected, or threatened, by the 1997 flood, the Project Team used the nine criteria listed below. If a type of recovery assistance met any one of these criteria, it was considered to have contributed to resilience in the Basin.

Did the recovery assistance provided for the structure(s):

1. Result in the permanent removal of residential or commercial structures from the floodplain?
2. Result in a level of flood protection greater than that existing before the 1997 flood or (for infrastructure) reduce exposure to future damage?
3. Supplement housing or other building stock outside of the floodplain?
4. Promote insuring structures against flood damage?
5. Facilitate recovery from future events
 - (a) of equal or less severity than the 1997 flood? and/or
 - (b) greater than the 1997 flood?
6. Foster self-sufficiency and responsibility
 - (a) at the community level, and/or
 - (b) at the individual level?
7. Operate without significant gaps in delivery or coordination that would have detracted from victim recovery?
8. Provide for mitigation approaches, either with specific policies, funding, or other means?
9. Promote community livelihood, quality of life, or environmental quality?

An affirmative answer to these questions indicates that resilience was enhanced by the recovery programs. Negative responses indicated that either the recovery program had no effect on resilience, or that, depending on the particular resulting actions, had a negative effect on resilience in the area.

Analysis of Recovery Assistance and Resilience

In presenting the evaluation, each of the questions is addressed in turn: the U.S. programs are examined first, the Canadian programs second. This provides the basis for the comparisons and conclusions that follow.

1. Did the recovery assistance result in permanently removing structures from the floodplain?

The United States

The voluntary buyout programs in the Greater Grand Forks area funded with recovery assistance monies included the actual purchase of the buildings and their lots, demolishing or relocating the houses, and incentives to hundreds of homeowners to sell their flood-prone houses. Although approximately 1,300 residential structures were purchased through the buyout programs, only about 800 of them, or about 8% of all those damaged in the flood, were permanently removed from the 100-year floodplain and adjacent flood-prone areas. The land vacated by the remaining 500

flood-prone houses may or may not be redeveloped. This is because all the lots purchased with FEMA's Hazard Mitigation Grant Program funds carry a permanent prohibition on redevelopment; they must remain in open space. However, the lots purchased with HUD's Community Development Block Grant money do not carry such a restriction, so their open space status is left to the discretion of the grant recipient (the locality or state).

Thus the recovery assistance for the buyout program contributed to resilience by removing some structures from the flood-prone area, and by allowing the cities to maintain that area as open space so that future flood damage will be minimized.

Recovery assistance (supplemented by insurance) also was used for a voluntary acquisition and demolition program to remove about 30 commercial structures from the floodplain in downtown Grand Forks. Redevelopment of this vacated area is underway. Recovery assistance already has been used to add at least two new buildings in the downtown floodplain, and long-range plans call for situating a new Town Square on some of the vacated lots.

The recovery assistance received for the water treatment plant in Grand Forks did not result in its removal from the 100-year floodplain, but if the permanent levee is built, it will be moved (along with the Third Street reservoir and three raw water intakes) because it lies in the path of the levee. A site outside the 100-year floodplain just west of Interstate 29 has already been designated.

Of the 16 school buildings in Grand Forks that were damaged by the flood, one was rebuilt at a new site out of the 100-year floodplain. All three East Grand Forks schools were destroyed by the flood, and new ones constructed out of the 100-year floodplain with funds from FEMA and the state.

Canada

While some structures on the Manitoba floodplain were removed, it is not possible to attribute this to either the intent or the actions of the recovery assistance programs. The exceptions to this occur in the rare situations where structures are to be removed so that ring dikes can be constructed (e.g., Ste. Agathe). In these cases, the removals are secondary to the primary recovery activity. The purpose of the Disaster Financial Assistance Arrangements is to restore dwellings to pre-flood conditions. This encourages fixing or rebuilding structures, not removing them. Similarly, the intent of the 1997 Flood Proofing Program is narrowly defined, to protect dwellings by making it more difficult for flood waters to invade them. Again, compensation comes from modifying the structure, not moving it. The sole exception to this was the provision of funds to relocate within a protected community. While some people chose to do so, the limited options on the locations to which relocation could occur were disincentives to others.

Neither the City nor the Rural Municipality have regulations that determine whether a structure should be moved and under what conditions this should occur. Even when structures are threatened by river bank instability there appears to be no great urgency to remove it. Discussions are more likely to focus on how to stabilize the river bank.

Equally true, the Province has, as yet, no mechanism for removing structures that are at serious risk of flooding. While there are discussions occurring about the possible integrated management of the floodplain, there does not appear to be much momentum behind them.

2. Did the recovery assistance result in increased levels of flood protection or reduced exposure to flood damage?

The United States

Of the grants provided to Grand Forks and East Grand Forks residents by FEMA under its Individual and Family Grant/Disaster Housing Program, about 4,000 included funds (a total of about \$2 million) specifically designated for household mitigation measures to provide an increased level of protection in the next flood. Most of these were for relocating the main electrical circuit box from the basement to the first floor. It is not known how many people who received these awards actually used the money to move their circuit boxes above flood levels.

The SBA provided 5,500 low-interest loans for repair and rebuilding of homes, but there was no requirement that the funds be used for flood mitigation measures, nor is there a record of how

many people who received these loans did anything about minimizing their future flood damage. SBA did, however, distribute written information about things people could do, such as elevating utilities and installing sewer backup valves.

Of the 350-400 landlords who received no-interest loans under Grand Forks' Community Development Block Grant-funded Rental Rehabilitation Program, or the approximately 1700 households that received grants from the city's other Community Development Block Grant-funded housing rehabilitation programs, it is not known whether any used the funds to take flood mitigation measures. Mitigation was not required as a condition of the loans or grants; it should be noted, however, that only a small proportion of those funds were disbursed to properties in the 100-year floodplain.

About 2,000 households received \$200 rebates from U.S. Department of Energy funds as incentives to replace their flood-damaged oil-burning furnaces with energy-efficient gas ones. Although there was no requirement to move the furnaces from the basement to the first floor (which would significantly minimize future flood damage in that household), the elimination of the fuel oil tanks from those basements will reduce future flood losses, because polluted floodwaters cause more damage than clean water.

In the homes that were cleaned, rehabilitated, or rebuilt with the help of volunteer agencies (an estimated 3,000 in the Greater Grand Forks area), few if any steps were taken to reduce future flood damage. The policy of the volunteer agencies' rehabilitation teams was that they would work towards putting the home back to its previous condition.

There is no indication that recovery assistance funds contributed to an increased level of flood protection or to the mitigation of future flood damage to commercial structures in Greater Grand Forks. Undoubtedly some businesses did undertake mitigation measures, but it was not a condition of the recovery funds they received. It should be noted that the new buildings built in the floodplain (with or without recovery assistance), such as the Corporate Center or the new *Grand Forks Herald* building, had to meet the City's building regulations for flood-prone areas; that is, be elevated above the base flood level or be floodproofed. However, most of the other downtown buildings that received recovery assistance were permitted to repair or rebuild to pre-flood conditions because they are historical structures. They were required to elevate their utilities.

Recovery assistance was used for a number of small, individual flood protection measures in several University structures. These will provide a degree of increased protection in the next flood: float switches for the elevators; sewer gate valves to prevent water from entering buildings; dirt floors replaced with concrete to inhibit mold growth and the spread of contaminants; electrical equipment moved from basements to main floors; the steam line buried to minimize the entrance of flood waters into the system. Most of the funds for these measures came from FEMA's Public Assistance program.

Recovery assistance provided by FEMA's Public Assistance and Hazard Mitigation Grant Programs resulted in improvements to the Grand Forks water treatment plant that will provide greater flood protection than existed before the 1997 flood. These included raising the telephone system, air compressors, electrical power feed grid, the electrical room, and the electrical transmitters—either from the basement to the ground floor or from the ground floor to the next level. The exterior transformers were all elevated to one foot above the 1997 flood level. A series of flood shields were put on the exterior doors, and valves and plugs were put on the storm sewers and sanitary system in case the streets are flooded again.

If the levee system is constructed as planned, and if it functions as intended, it will provide protection to Greater Grand Forks from the 210-year flood, a greater level than existed before 1997. However, it may render existing flood-resistant building standards inapplicable. Further, new mortgages for buildings in the area protected by the levee will not carry the flood insurance purchase requirement. These two factors have the potential to greatly increase damage and losses if the levee is breached or overtopped in a future flood. Perhaps the best way to sum up this situation is that the levee would enhance resilience for floods up to its design level, but detract from resilience for floods above that, or for floods in which a portion of the levee system fails.

One substantially damaged school in Grand Forks was rebuilt on the same site with recovery assistance funds, but elevated to 1.5 feet above the base flood level, providing better flood protection

than it had before. Of the other damaged schools, recovery funds and technical assistance were used to implement numerous measures to provide more protection than existed previously, including moving libraries out of the lower levels, relocating heating and ventilation systems to ground level or higher, and moving computers and driver's education simulators from ground or garden levels up to the next floor.

The vast majority of the assistance for the repair of damaged roads was used to restore them to their previous condition. A small amount of money from FEMA's Hazard Mitigation Grant Program was awarded to place (or replace) culverts; in each instance the new culvert was determined to contribute to better storm drainage, and thus could be considered to provide a higher level of flood protection to the immediately surrounding area. There is no indication, however, that overall drainage was considered in each instance of culvert placement, so it cannot be said with certainty that these would result in reduced overall losses.

Canada

In Manitoba, the 1997 Flood Proofing Program was designed to provide increased levels of flood protection. Ste. Agathe and Grande Pointe are scheduled to receive ring dikes, along with many other communities in the valley. Construction for Ste. Agathe is to occur this year, while there is a delay in the construction at Grande Pointe. Both dikes will be built to the criterion of 97+2. In addition, Winnipeg is designing a levee for St. Norbert. When these projects are completed, all the communities in the study area will have better flood protection than they had before the 1997 flood, and with due vigilance and diligence during a flood episode, should be able to survive a flood of similar magnitude.

There is a great deal of faith in the ring dike strategy. As in the United States, there is no requirement for floodproofing within the structurally protected areas. Nor is there any encouragement for taking other mitigative actions. The faith reflects the success of the strategy over the previous 50 years.

Yet the strategy guarantees a repeat of the 1997 experience, possibly with more adverse outcomes. In 1997, ring dike communities had sufficient time to raise their dikes and, with the help of good weather, were able to withstand higher flood conditions than those for which the dikes were designed (1979+2). When the floods predicted by Booy (1997) occur, the communities will again be struggling for their survival. If the dikes are breached, the magnitude and cost of the clean up will be amplified by the absence of secondary mitigative actions.

In 1997, St. Norbert was protected by the Floodway. Under the conditions envisaged by Booy (1997), the Floodway would be inadequate, and St. Norbert will be inundated (along with most of Winnipeg). Expanding the capacity of the Floodway is being examined as a possible solution to the scenarios.

Outside the ring diked communities, the 1997 flood greatly exceeded the magnitude of a 100-year flood. Structures outside the 100-year floodplain were damaged. By using the 1997 floodplain as the standard for implementing floodproofing activities, the Province pursued more aggressive protective measures than would have resulted from employment of a 100-year floodplain approach to regulatory requirements. All rebuilding and new construction done by those with unsalvageable damage have to meet the 97+2 requirements. Major incentives (return of the \$20,000 deductible on the Disaster Financial Assistance Arrangements) were provided to other residents, if they also floodproofed their properties. While it was not mandatory for the latter group to participate, and there were problems associated with the program, large numbers did. As a consequence it can be concluded that, overall, the recovery assistance programs met their goal of enhancing flood protection outside ring dikes.

In summary, one of the objectives of the recovery assistance in Manitoba was to increase the magnitude of protection to communities in the valley. The construction of ring dikes accomplishes this, with the caveat that events that are larger than the flood of 1997 will be threats to this enhanced level of protection.

3. Did the recovery assistance supplement housing or other building stock outside of the floodplain?

The United States

Part of the recovery assistance received for the buyout program (a short-term loan from HUD, Community Development Block Grant funds, and a loan from the Federal National Mortgage Association) was used to help finance the construction of 220 new homes in three subdivisions outside the floodplain within Grand Forks. This contributed to resilience by supplementing the stock of non-floodplain housing and compensating for the hundreds of flood prone homes that were removed in the buyout. Partially in response to the housing shortage precipitated by the flood, Habitat for Humanity accelerated its ongoing building program and the three houses it built during 1997 and 1998 contributed to non-floodplain housing as well.

Recovery assistance was used to construct a new manufacturing/warehouse/office building in Grand Forks' industrial area out of the 100-year floodplain. This increased the City's flood-free commercial building stock.

The levee proposal would not affect the supply of housing or commercial building stock outside of the 100-year floodplain. However, some proponents argue that the existing buildings in the 100-year floodplain would be no longer at risk after the levee is built, because their flood hazard designations on the Flood Insurance Risk Map would be removed. However, as noted above, they do in fact remain at risk—probably greater risk—under certain foreseeable circumstances.

Canada

Part of the recovery assistance provided in Manitoba was for temporary rental housing while reconstruction of a primary residence occurred. The program was designed to meet the needs of the family and to have them located as close to their primary residence as possible. However, there was no systematic program of exchanging floodplain property for property outside of the floodplain. This outcome would be expected, partly because of the narrow terms of reference in the financial assistance policies, and partly from the breadth of the floodplain in the study area.

4. Did the recovery assistance promote insuring structures against flood damage?

The United States

In the Greater Grand Forks area, the purchase of insurance was a major condition of recovery assistance. All federal recovery assistance for homes and businesses was contingent upon flood insurance being carried on the structure if it was in the 100-year floodplain. This included repair and rehabilitation loans from the SBA and Individual and Family Grants from FEMA. In addition, Grand Forks used Community Development Block Grant funds to provide grants to help businesses pay the premiums on the flood insurance policies that were required by their SBA loans. Most of the Grand Forks' rehabilitation programs did not apply to floodplain properties, so no insurance was required. Nor did the furnace rebate program mention flood insurance. All recipients of FEMA's Individual and Family Grants who are required to obtain flood insurance must also keep it in force, otherwise they will not be eligible for disaster assistance in the next flood. In practice, however, it has proven difficult to ensure that, once having purchased a flood insurance policy, people maintain it.

Similarly, recovery assistance from FEMA was received by the University only upon condition that the University obtain flood insurance on all its 100-year floodplain structures. The insurance has to be maintained for 20 years on the buildings and for 10 years on the contents. If the University lets the insurance lapse, it will be billed for all the recovery assistance funds paid by FEMA after the 1997 flood, and will be ineligible for future assistance.

The Grand Forks schools' commercial insurance contributed a little less than 1/3 of the payments for the flood damage the district suffered. Flood insurance was required as a condition of FEMA assistance. The East Grand Forks school district had no insurance before the flood, but as a condition of the federal funding for the new schools flood insurance will be carried on the schools from now on. Thus, in both cities, at-risk schools are now to be insured.

It is an open question as to whether levee assistance will result in promoting flood insurance. On the one hand, having the levee in place would result in the removal from the Flood Insurance Rate Map of the 100-year floodplain designation for most of the cities' area. Thus, flood insurance would no longer be required for buildings with federally backed mortgages. On the other hand, as a condition of its funding of the levee, the Corps will require Grand Forks and East Grand Forks to continue participating in the National Flood Insurance Program, making flood insurance available to property owners if they desire it. The consequence of this is unclear.

Canada

In Manitoba, residential flood insurance is generally unavailable, although commercial coverage can be obtained. The 1958 Royal Commission, which examined the consequences of flooding, discarded exploring the potential value of flood insurance early in its proceedings (Bumsted, 1997). Since then, neither senior levels of government nor the insurance industry have appeared interested in pursuing a systematic approach to insuring for flood damage.

The recent introduction of private flood insurance in Manitoba's Red River Valley has resulted in only a few subscribers. Whether this is a result of its cost, lack of knowledge about its availability, or the accessibility of alternative solutions is not known. But it appears that at the present time, residents of the valley are not interested in commercially available residential flood insurance policies. No Canadian recovery assistance program promotes participation in such programs.

5. Did the recovery assistance facilitate faster recovery from similar events in the future?

The United States

Fewer flood-prone houses means fewer flooded houses. So the buyout assistance did promote a faster recovery.

The mitigation measures installed in the water treatment plant should enable the plant to continue operating in the next flood, so both the facility's and the city's recovery should be more rapid because water service will not be interrupted. The flood emergency plan devised for the facility would also contribute to faster recovery. Recovery from a future flood should be facilitated for those schools and University buildings whose utilities, computers, and similar equipment were elevated with recovery assistance funds.

To the extent that the new culverts promote local drainage of storm water, they can be said to facilitate recovery of that area, because flood waters will leave the area sooner and roads will not be flooded or at least not for as long a period.

If the levee system works as anticipated, it also will speed recovery from floods of less than its design level, because there should be little damage. On the other hand, it could make recovery slower for floods that exceed that level, or that cause a failure in the system.

If any of the homes' circuit boxes were raised with the recovery assistance funds, as intended, that would facilitate a faster recovery for that household in the next flood. Although a dry circuit box does not guarantee that electric power would not be interrupted, it does improve the likelihood that there will not be significant problems with the electricity within that house. Maintaining electric power makes recovery easier because the electric sump pumps that many households have in their basements could operate, draining the lower areas of flood waters. Also, people would not be hindered in their cleanup by having to work without electricity or even evacuate because of the power loss. Most of the repair and rebuilding assistance for houses and businesses, however, did not encourage measures that would minimize future recovery time. However, federal recovery assistance to individuals and businesses in the 100-year floodplain did require that flood insurance be purchased, which will contribute to faster recovery from the next flood.

Canada

Assuming that the actions initiated under the 1997 Flood Proofing Program are completed and implemented correctly, then recovery from a 1997 level flood should be more rapid. Ring dikes will protect the communities; homes on mounds or surrounded by a dike would not flood. Only properties

that have not, or could not, participate in the floodproofing program would be at risk. Consequently, the level of damage from such a flood would be much lower. Moreover, it would be easier to prepare the communities and protected homes for the flood, and it would be easier to defend them when the water is high. With lower costs and less effort required, there would be much less stress to the individual, the community, and the province. However, the same would not be true in a larger magnitude flood. At that time, the cycle of events that occurred in 1997 likely would be replayed.

6. Did the recovery assistance foster self-sufficiency and responsibility at the community and/or individual levels?

The United States

With the possible exception of flood insurance, which would help keep households and communities on their feet after a flood disaster if it were more widely purchased, most recovery policies in the United States are not specifically intended to increase individual or local self-sufficiency. This is ironic in the case of localities, because the underlying philosophy of the federal disaster policy is that the states and federal government provide assistance only when the locality's resources and capabilities are exceeded. Nevertheless, some recovery assistance does foster self-sufficiency indirectly.

Any time the number of at-risk homes and businesses is minimized (as they were through the buyout program), the localities can be said to have enhanced their self-sufficiency, because the potential flood damage is likely to have been reduced. The mitigation measures that were taken with regard to infrastructure and funded with recovery assistance are contributing to Grand Forks' self-sufficiency, because there is now a greater chance that the water service will stay in place, minimizing the need for emergency assistance from the state or federal governments.

During the recovery, the University developed a plan for a temporary coulee levee, which should divert future flood waters from a portion of the campus. Having this plan makes the University more self-sufficient, but it is not clear whether it was the product of specific recovery assistance or simply a result of heightened awareness. The same can be said for plans for a diversion route on the south end of campus, and plans for installing a valve on the north end of the coulee to prevent water from backing up. In general, the University considers itself much more aware of potential mitigation measures now, so future buildings will be planned with utilities above the lower level. Certainly this awareness and these plans are indicators of enhanced self-sufficiency.

Although Altru Hospital did not receive significant recovery assistance, some of the steps it took during recovery illustrate what can be done by a facility intent on achieving a greater degree of self-sufficiency. The hospital's physical plant was saved during the flood, not as the result of implementation of an emergency plan, but by quick thinking and resourcefulness. In spite of this, the hospital had to close because of its reliance on external sources of steam, electricity, and water/sewer systems. As a result of the flood, the hospital now has a disaster response plan in place. Altru has installed shut-off gates on the storm sewers and at the site of its parking lot. It has installed back-up generators. It has located a source of dirt for constructing an emergency dike if needed in a future flood.

Both cities' school systems can be considered to be much more self-sufficient now than more (in East Grand Forks' case, all) of the schools are out of the floodplain and, in addition, carry flood insurance. The districts should not have to rely on much outside assistance for their buildings in a future flood.

Any improvement in the drainage systems made with recovery assistance could probably be considered to be contributing to self-sufficiency for the cities. However, if the faster drainage is increasing flood levels elsewhere, or degrading wetlands or other natural resources, overall resilience will not be enhanced.

To the extent that the cities and individual flood-damaged households relied on the wide range of recovery assistance available, it could be said that much of the recovery assistance actually detracted from self-sufficiency and individual responsibility. One might argue that the unprecedentedly large wave of federal assistance fostered an expectation that neither the cities nor individual

households need concern themselves too much with preventing future damage, because assistance will always be forthcoming. Two partial exceptions are the SBA assistance and FEMA's Individual Family Grants, both of which required purchasing flood insurance, which increases self-sufficiency, but those requirements only applied to people and businesses within the 100-year floodplain. As noted above, there is no effective mechanism to ensure that the insurance policies are maintained into the future.

Whether or not the assistance for design and construction of the proposed levee fosters self-sufficiency is also a matter of debate. On one hand, the cities are relying on federal assistance for a levee project (funded with taxpayer dollars) to relieve them of the risk inherent in their flood-prone location. Although a condition of the project is that the cities take full responsibility for operation, maintenance, and repair of the levee system, it is hard to believe that in the event of a significant (not even necessarily catastrophic) failure, the federal government will not be prevailed upon to supply personnel, expertise, and funding. In addition, it has been demonstrated that structural protection projects engender a sense of invulnerability or at least indifference to the flood hazard and can even induce development. Thus, over the long term, Greater Grand Forks may become relaxed about the risk and gradually diminish efforts to take mitigation measures, maintain insurance, keep the public informed, and so forth. That state of affairs would leave the cities open again to the need for massive outside assistance in a future flood—that is, not self-sufficient.

On the other hand, if the levee is built, theoretically Greater Grand Forks will suffer no flood damage that it cannot handle by itself, as long as the flood does not exceed the capacity of the structure.

Canada

Government sponsored recovery assistance programs in Manitoba are designed to facilitate the reestablishment of structures to their pre-flood status. Thus, the programs are not designed to increase the self-sufficiency of either communities or individuals. Communities and individuals that were self-sufficient before the flood presumably retain that state at the end of the recovery period. Those that were not, would continue not to be. While this presumption may be true for the communities of the study area, it is not true for the residents of the floodplain, whose post-flood levels of self-sufficiency have decreased (see discussion below).

On the other hand, the 1997 Flood Proofing Program could be considered to indirectly enhance self-sufficiency. This is because the program's participants will have better protection, so will need less external assistance to cope with future hazards of similar magnitude. Moreover, to the extent that the continuity of economic well being is vital to the self-sufficiency of a community, the proactive restoration of economic well being would promote self-sufficiency. The Jobs and Economic Restoration Initiative, RESTART, and Business Resumption Loan programs' primary objectives were the restoration of the economic base of the community. Thus, the programs restored the existing level of this aspect of self-sufficiency, but perhaps more importantly, prevented its substantial erosion.

Programs aimed directly at self-sufficiency for communities and for individuals were sponsored by the Red Cross and Salvation Army. The largest in scope was the Community Conversation that occurred in Ritchot and included Grande Pointe and Ste. Agathe. The program is a grass roots one that involved about 40% of the population of the RM. The goal of the program is to establish a sustainable development plan for the RM that takes into account its location on a floodplain. The program models a long-standing edict in the international disaster management literature (e.g., Interagency Floodplain Management Review Committee, 1994) that states that those at risk need to be involved in designing the approaches to ameliorating those risks, if the new approaches are to be effective.

The Conversations are basically an experiment. The program is unique in Manitoba. Sustaining it will be a major challenge for the community, because the program does not fit into conventional funding categories. Whether it will ultimately generate approved action plans and priorities for the RM remains to be determined. However, the Conversations are already a success in that the community is looking forward and attempting to take control of the issues that are important to its future. This is a major component of self-sufficiency. Thus in the RM of Ritchot, recovery

assistance has promoted self-sufficiency. However, this is a characteristic of the experiment that is underway, and not a comprehensive program occurring in all the flooded areas in Manitoba.

7. Did the recovery assistance program or policy operate without significant gaps in delivery or coordination that would have detracted from victim recovery?

The United States

In general, the recovery process in the United States proceeded smoothly. Over the past 5-10 years the Federal Emergency Management Agency has refined its procedures both for implementation of its own post-disaster programs and for coordination with other federal and state efforts. There were many reports of healthy and even exemplary cooperation among agency personnel, levels of government, and the public and private sector. It was reported that the mitigation funds for some of the projects were disbursed faster than ever in FEMA's history, and FEMA prides itself on dispensing individual aid within days of the disaster's impact. Other federal and state agencies are similarly well-equipped and prepared to provide assistance of various sorts during disaster recovery.

Canada

In Manitoba, the recovery process continues for the victims of the flood. Even for those that have returned to their homes, the process is incomplete. The sustained effort, first in preparing for flood, then attempting to defend their homes, followed by evacuation and the process of recovery, physically and emotionally drained many residents. Some had not recovered from the impact of the flood of 1996 and were, in fact, sufficiently impaired by it that they were unable to initiate flood preparation activities in 1997 (see Rahman and Tait, 1997). The cumulative effects have been devastating and the psychosocial consequences, noted earlier, will persist for some time.

The management chaos at the beginning of the recovery period came when the residents were most vulnerable. Consequently, its impact was much more debilitating than it would have been for a less vulnerable population. People felt re-victimized by the Province and even the simplest of administrative requirements became almost insurmountable tasks. Resentment, anger and a sense of helplessness resulted from these interactions. This phase of the recovery assistance clearly exacerbated the flood trauma. Eventually, administrative complexities were simplified and the redundancies in requirements reduced. Eventually, programs were put in place to address psychosocial needs. The programs were generally viewed as successful. However, it was also the view of the recipients and the providers that the programs would have been far more successful if they had been introduced earlier. Some thought the programs needed to be more intensive and to provide more advanced psychological interventions.

Eventually, most of the residents will recover from the impacts of the flood. Many may stay hypervigilant to indices of possible flooding, but otherwise should have little trouble functioning normally. On the other hand, it will take a considerable time period for many residents to recover economically. The costs incurred in flood fighting and flood damage repair have depleted the resources of many. This is particularly true for older residents who are modifying retirement plans and worrying about having adequate pensions. With fewer financial resources, residents will not be able to mount the same type of effort that was seen in 1997. This is not a good omen for the success of future flood fighting in the area.

8. Did the recovery assistance provide for mitigation approaches, either with specific policies, funding, or other means?

The United States

In the last few years the concept of preventing or at least minimizing hazard losses before they occur has become a staple of federal policy in the United States. In 1995 FEMA issued a National Mitigation Strategy, setting forth the premise that mitigation is the "cornerstone" of emergency management activities. Since then, provisions for mitigation measures have been incorporated into many recovery assistance programs and policies, some with greater success than

others. There is also a specific Hazard Mitigation Grant Program, which is funded after a disaster (if the state requests such funding) at a level of 15% of the total funds for individual and public disaster assistance. Technical assistance for mitigation planning and implementation of specific measures is widely available from federal, state, and private sources.

Canada

In Manitoba, the recovery assistance was available only for narrowly defined actions. Mitigative actions, other than floodproofing, did not qualify for assistance. For example, moving an electric panel from the basement to the first or second floor so that it would not be damaged in subsequent floods was an action considered to be an improvement to the building, and therefore, not eligible for compensation. Neither provincial nor federal policies promote mitigation. Nor do they provide a means for financing mitigative actions.

Over the past year, there has been a concerted effort, sponsored by the Institute for Catastrophic Loss Reduction and EPC, to develop a national mitigation policy. In the regional and national forums that have been held, a strong consensus on both the contents of such a policy and support for having such a policy emerged. Such a policy would certainly facilitate controlling the development on the floodplains of Manitoba. To obtain such a policy, however, will require strong advocacy to overcome the political inertia surrounding the issue.

9. Did the recovery assistance contribute to community livelihood, quality of life, or environmental quality?

The United States

Having a stock of housing that is less flood-prone overall can be said to contribute to community livelihood of both the cities in the study area. In addition, Grand Forks' Home Moving Program and the incentives it offered for participation in the buyouts both had conditions that the recipients not relocate or purchase homes outside of the city limits. The city thus used recovery assistance to help maintain its work force, tax base, and sense of community, all of which contribute to resilience. The way in which the city used recovery funds to help finance the construction of new homes within its jurisdiction also served these purposes.

About 5,500 households and businesses (roughly half of those flooded) received rebates out of recovery funds as incentives for replacing their flood-damaged furnaces with energy-efficient ones. These new furnaces consume less fuel and give off fewer pollutants, which incrementally improves the quality of life in the Red River Basin. All of the housing repair and rehabilitation assistance can be said to be contributing to community livelihood, because people need decent places for themselves and their families to live before they can be productive members of the community in other ways.

A great deal of the recovery assistance for commercial areas was directed towards enhancing community livelihood: getting businesses back on their feet; keeping the cities' downtown areas and waterfronts alive and even making them more vital and aesthetically attractive; maintaining and increasing the tax base; attracting new development with infrastructure, parking facilities, planning, and design; restoring the river walkways; and designing and building the "invisible floodwall," which is intended to preserve the view of the river from the downtown area.

Paradoxically, the perception of protection that the levee would provide probably will contribute indirectly to community livelihood, because the population may believe that the flood problem is "taken care of." That belief is probably good for business, which in turn contributes to overall resilience.

Having new, non-flood-prone schools and other school buildings that were improved with recovery funds probably contributes to community livelihood, because the overall quality of life is improved when the school facilities are perceived to be safe and up-to-date.

Some of the land vacated through the buyout program will become a public open space. The planned greenway will stretch along both sides of the river throughout both towns, and will include parks, all-season trails, scenic overlooks, boat access, and other amenities. Thus the recovery

assistance for the buyout program has contributed to resilience by providing residents with recreational and aesthetic benefits that improve their quality of life.

Canada

The communities in the Manitoba study area were taxed by the flood. All were evacuated; two suffered serious and extensive flood damage. As part of the recovery assistance, community needs were addressed by a variety of programs. Infrastructure recovery occurred through the Disaster Financial Assistance Arrangements; increased protection for the future through the 1997 Flood Proofing Program. The recovery of the economic base was supported through the Jobs and Economic Restoration Initiative.

The Red Cross, Salvation Army, Trauma Team, and numerous church and service organizations, including emergent organizations in the disaster area, arranged activities designed to increase social interactions, offer respite from recovery activities, and to provide the opportunity for mutual social support. These organizations worked with community leaders to identify needs and then provided the assistance aimed at meeting the needs, sometimes through the use of their own employees and volunteers, and sometimes by funding the activities from the donations that they received from across Canada. Similarly, emergent organizations within the rural communities, focussed on identifying their communities' needs and either advocated for assistance so that the needs would be addressed, or organized activities to address them. Some of these activities will have long-term benefits for the communities (e.g., moving, rebuilding and refurbishing a community hall; installation of informational bulletin boards; improvements to school yards) and have the potential for enhancing community livelihood.

At the community level, the recovery assistance appears to be successful. St. Norbert, which suffered little damage when calculated on the proportion of the population that suffered major flood losses, returned to its prior level of functioning fairly quickly. Ste. Agathe, which was in the process of initiating an economic development plan at the time of the flood, had these activities disrupted. The recovery assistance programs have provided a base for the community to again focus on the future. Grande Pointe is more difficult to judge. Before the flood it was a bedroom suburb of Winnipeg and its interactions were more with the City than the RM. Perversely, the flood itself probably instilled more of a sense of community than existed before its occurrence. The sense of community is based on negative emotions that resulted from their collective experiences with the RM and the Province before, during, and after the flood. In particular, anger resulted because the provincial government failed to recognize and compensate for the damage that the community attributed to the manner in which the Floodway was operated to protect Winnipeg. The Manitoba Water Commission report confirmed the basis for the community's anger, but did not dissipate it.

The differences in how the programs addressed community livelihood are important. Infrastructure and economic recovery are funded through government programs; social issues are not. To a great extent, the social programs were mounted using donations and/or volunteers. Consequently, the magnitude and scope of social programs depends on factors outside the control of the formal recovery management system: no donations, limited programs; no volunteers, limited programs. Yet it is well recognized that disaster recovery requires a systematic mending of a community's social fabric.

At the individual level, the recovery assistance was much less effective, as discussed above. The conclusion is mentioned here because community survival ultimately depends upon the people. If a sizeable proportion of community population is experiencing difficulties, the community's vibrancy will also experience difficulty.

Summary

It can be seen that the types of recovery assistance provided in both the United States and Canada after the 1997 floods on the Red River of the North varied greatly in their contribution to overall resilience of the Red River Basin. The findings discussed above are summarized in the Table 5.

Table 5. Efforts to Promote Resilience: Summary and Comparisons Across the Border.

Does the Recovery Policy, Program, or Assistance . . .	in the United States	in Canada
Result in permanent removal of structures from floodplain?	Y	N
Provide increased protection of structures from flood? (floodproofing, etc.)	Y	Y
Supplement flood-free building stock?	Y	YQ
Promote insuring structures?	YQ	N
Facilitate recovery in the future From an equal-to or less-than-1997 event? From a greater-than-1997 event?	Y/N ?	YQ NQ
Foster responsibility/self sufficiency At the community level? At the individual level?	Y/N Y/N	YQ N
Operate without significant gaps in delivery or coordination that detract from victims' recovery?	Y	N
Provide specifically for mitigation?	Y	NQ
Promote community livelihood?	Y	YQ
Y = yes N = no ? = not clear from study YQ = qualified yes NQ = qualified no		

VI. CONCLUSIONS

This section summarizes the major observations of the project, then details similarities and differences between the approaches taken towards recovery in the two countries. Next, policy recommendations for enhancing resilience in the Basin are presented. The final section identifies issues that need more detailed analysis before their impact on resilience can be fully understood.

Summary of Findings

In the Red River Basin, there were many kinds of assistance provided in the wake of the 1997 Red River flood, including financial assistance consisting of grants, loans, cost-sharing, and gifts; technical assistance; and contributions of services, materials, and other needed goods. Although it is not possible after a flood of this magnitude to put things back just the way they were before, it is fair to say that the recovery effort did a good job of restoring the buildings and other structures in the Basin. Although this study focused on structures, the collateral evidence suggests that economic restoration also was facilitated by the recovery activities. Less success was seen at the household and individual level, particularly in Canada, where problems were identified during the recovery period.

The recovery effort restored a high level of functioning to Grand Forks and East Grand Forks. In some ways the communities were improved as a result of the recovery assistance they received. In other ways the recovery assistance fell short of fostering long-term resilience. Although hundreds of residences were permanently removed from the 100-year floodplain in Greater Grand Forks, the 100-year and 500-year floodplains are still heavily developed. The expected protective levee will certainly relieve flood worries, probably for many years, but there is still the potential for damage when river discharges overtop the levee, or if the levee is breached. This is particularly true in light of the local perception that the levee "solves" the flood problem and takes away the risk. This idea, and the fact that the flood hazard area designation on the regulatory maps would be removed from the true 100-year floodplain area after the levee is built, will doubtless act to discourage any backup mitigation and there is little doubt that the flood insurance purchase requirement and the building regulations currently in place for the flood hazard area will be dropped at that time. Further, a large majority of the housing in the area consists of homes built on basements, and these were repaired and refurbished *en masse* with recovery assistance received. There they sit, at risk and mostly uninsured.

In Canada, recovery assistance focused on restoring structures. The opportunity to take major mitigative action was missed. Removal of structures, buyouts, and the promotion of repairs that would reduce future damage did not occur programmatically. Only the narrowly defined floodproofing program was activated. Yet the term "floodproofing" is an oxymoron, particularly when relatively low levels of protection are being advocated. To the uninformed, it means that if the standard is met, they should be safe, that is, the risk is zero. Consequently, when the inevitable larger flood occurs, they will feel betrayed and be angry, the same emotions expressed during the flood of 1997. The false sense of safety generated by this flood protection program works against the long-term resilience of the residents.

Similarities and Differences Between the Two Countries' Recovery Assistance

Conditions on Recovery Assistance

A typical condition of financial recovery assistance in the Red River Basin was that the funds could only be used to put the damaged structure back to its "pre-existing" condition. The intent of this policy no doubt is to prevent flood victims from profiting at taxpayer expense by ending up with a

home, business, or other structure that is better than their pre-flood structure. However, this can act as a deterrent to mitigation measures, particularly in the case of infrastructure that could use strengthening, enlargement, or elevating. Although it is true that, in the United States, other programs are targeted specifically for mitigation to remedy this, does having separate programs make sense?

In the United States, an effective condition attached to the buyout recovery funds of FEMA's Hazard Mitigation Grant Program required that the land so purchased never have structures built upon it. This builds resilience by enlarging the open area over which future flood waters can spread without causing property damage. The absence of a parallel condition attached to the Community Development Block Grant funding (from HUD) inhibits resilience. This is especially true in the case of Greater Grand Forks, where the expectation of the permanent levee "removing" the structures from the mapped flood hazard area is contributing to the sense that the flood risk will be gone and thus any other mitigation is (or will be) unnecessary.

Virtually all of the federal recovery assistance funds provided in the United States carried with them the condition that the structure to which the funding was applied must carry flood insurance if it lies in the 100-year flood hazard area. Different means are used to require the initial purchase of the insurance policies, but there has been minimal success in finding a way to make sure the coverage is maintained through the years, especially in the case of individual homeowners.

In contrast, in Manitoba the only condition on financial assistance was that only approved costs could be reimbursed. Specifically excluded were all improvements to infrastructure (for communities) and any construction that led to improvements to a structure. Individual mitigation actions, such as elevating electrical boxes, were considered structural improvements and did not qualify for reimbursement. The only program that encouraged mitigative action was the optional¹⁷ floodproofing program, which contained a major incentive—the reimbursement of the 20% deductible associated with the Disaster Financial Assistance Arrangements. Thus, Manitoba did not take advantage of the opportunity to promote mitigative actions during recovery by applying conditions for such actions to the financial assistance it provided.

Insurance

Flood insurance is not recovery assistance, because it is neither donated by outsiders nor paid for by taxpayers. Moreover, flood insurance is not mitigation, because it does not minimize damage or losses. Nonetheless, flood insurance is a highly effective mechanism for fostering individual responsibility and building local self-sufficiency, thereby contributing to basin-wide resilience. Compared to people who rely on disaster assistance, those who have insured their building and contents come far closer to being "made whole" after a flood disaster and have fewer restrictions on how they can spend the money. From a federal policy perspective, flood insurance is attractive because it minimizes the amount of taxpayer funds that must go to "bail out" people who have chosen to live in hazardous areas. Claims payments are funded by the pool of other policyholders, and not by the government.¹⁸

Unfortunately, and despite many, many attempts in the United States to make it otherwise, people do not avail themselves of this affordable and sensible option. Grand Forks and East Grand Forks were not exceptions to this tendency. Before the flood, fewer than 20% of Grand Forks homeowner households had flood insurance. Many new post-disaster policies were purchased as a condition of receiving recovery assistance. By law, these recipients of federal aid are required to

¹⁷ For those who did not suffer unsalvageable damage. For those with unsalvageable damage, reconstruction required participation in the program.

¹⁸ The National Flood Insurance Program in the United States operates and pays damage claims out of income it receives from premium payments and fees from policyholders. The NFIP does have the authority to borrow from the U.S. Treasury if claims payments from a devastating flood (or, more typically, a series of floods) temporarily depletes the NFIP's fund, but the monies borrowed are paid back to the federal government over the next year or so. Thus the federal government provides a financial safeguard for the NFIP, but over the long run the insurance program is self-supporting.

maintain the insurance in force, or they become ineligible for future disaster aid. In practice, however, this condition has been difficult to enforce in a new disaster, and there is no effective mechanism in place to ensure that people renew their policies, once purchased. This is especially true in an area like the Red River Basin, where most homes have livable basements, which are only minimally covered under the standard flood insurance policy.

In Manitoba, on the other hand, flood insurance was not available to residents in floodplains until after the 1997 flood. The lack of enthusiasm for the private insurance recently made available indicates that Manitobans do not appear to perceive insurance as a affordable option to ameliorate the risks that they are taking. Given the devastation that occurred and the number of people who suffered substantial economic losses, this is somewhat surprising. Moreover, the outcome is inconsistent with the public discussions in the months immediately after the flood, when there was an outcry for having flood insurance available. Further, it is questionable as to whether the most vulnerable residents—the elderly, physically challenged, single-parent families, and the poor—are in a position to participate in such a program.

Gaps in Recovery Assistance

The recovery effort in the United States was generally well coordinated and efficient. Federal and state agencies worked systematically to identify and distribute appropriate assistance and to prevent duplication of services. The North Dakotans and Minnesotans had a much better idea, both before and during the flood, of what kind of recovery assistance they could expect from the government than did the Manitobans. This is largely because, over the past decade (and especially the last five years), the U.S. federal government has developed and repeatedly practiced a system for providing assistance and publicizing its availability. This response system involves relatively large numbers of trained and experienced personnel, along with equipment and supplies, most of which come to the stricken area from other parts of the country; standard agreements for cooperation and coordination among entities both public and private; cost-sharing arrangements; telephone registration for victims; and aggressive public relations work.

In contrast, the timing and management of assistance resources were real problems in Canada, at least initially. Many of the early problems were alleviated, but at great cost to the residents' emotional well-being. Recovery assistance efficiency in Manitoba was further diminished by the fact that some recovery workers were victims of the flood themselves; they shared the traumatic experiences of those they were trying to assist. Many of the nongovernmental organizations were exceptions, however, because they brought in volunteers from across the country to assist in the recovery phase. Finally, in Canada, lessons learned in one part of the country do not appear to be effectively communicated to other parts.

In the United States, there was a great deal of information available both at the expert and lay levels about recovery and, for example, techniques for floodproofing. By most accounts it was widely distributed to both organizations and individuals after the flood. In Canada, by contrast, information needed for aspects of the recovery and rebuilding was either not readily available or the process of accessing it was not known. For example, residents expended much time after the 1997 floods looking for instructions for drying out basements, and figuring out the best way to deal with mold-related problems.

Cost Sharing

In both countries, the cost of recovery assistance is shared among various levels of government. The different cost-sharing arrangements were described in Sections III and IV, above. Based on the information collected for this study, it appears that in Canada a slightly greater proportion of recovery costs were borne at the local and provincial levels than were borne by states and localities in the United States. For example, no more than 50% of cost of the Manitoba floodproofing program will be covered by the federal government, while 50% or more of the cost of the levee project in Greater Grand Forks will be funded by the federal government.

Floodplain Regulations and Management Tools

In the United States, the national standard used (the 100-year flood) is widely institutionalized. However, in some cases the use of this standard encourages reconstruction and recovery to a level that has already proven either incorrect or obsolete. By contrast, Manitoba's "97 plus 2 feet" policy enables a locale to adapt to a changing situation—whether that change is that floods are becoming more severe (higher discharges) or simply that the data in hand has not reflected the true potential of flooding in that watershed.

Both sets of regulations are historically based, generated on the bases of events that have happened. Neither takes into consideration possible changing conditions, nor events that are likely to happen over a protracted but finite time. Booy (1997) took the latter tactic and asked the question: "What design flood should be selected to prevent the flooding of Winnipeg in the foreseeable future with a reasonable degree of confidence?" His analysis suggests that to be 95% confident that Winnipeg's flood control system will not fail in the next 50 years would require it to be expanded to almost twice its current capacity. If it is not, there is a 50% chance that the flood control system will suffer a catastrophic failure over the same period. While Booy's study was restricted to flood control systems and to the City of Winnipeg, its logic could be extended to the whole Basin. It has a major advantage of translating risk for rare events into terms that are readily understood. And understanding risks is necessary, if individuals are to voluntarily take mitigative actions.

Booy's approach focuses on what may happen, not on what has happened. By concentrating on the future and the challenges that await residents there, it provides a clear statement of future risks. Knowledge of such risks is fundamental to enhancing resilience because they define the end points that current and future actions are designed to prevent or minimize.

Finally, in considering floodplain management regulations, it is important to consider population and settlement redistribution in the Red River Basin. For example, in Manitoba the trends in recent decades show that the rural municipalities, communities along the Red River, and small urban centers around Winnipeg are experiencing significant growth. Since most of these locations are flood-prone, more people are being placed at greater risk. This is a relative statement because much of the migration is from Winnipeg, where there is a higher degree of protection, to the less protected rural areas. In the absence of systematic land management regulations and enforcement, the economic consequences of the next major event will increase.

Flood Control Structures

The structural flood control systems in the two countries were differentially effective. In Canada, the complex engineered structures (reservoir and diversionary systems on the Assiniboine and Red Rivers) generally successfully protected Winnipeg and its suburb St. Norbert. Ring dike communities also successfully held back the river. Where communities were flooded, the flooding resulted from the failure to understand fully how the flood waters would travel across land (St. Agathe, Grande Pointe) and the failure to understand the consequence of operating the Floodway gates to levels that surpassed previous operations (Grande Pointe).

In contrast, Grand Forks and East Grand Forks did not have in place a fully engineered structural flood protection system. The existing temporary levees failed to protect the cities, partly because of the short preparation time available to reinforce them, and partly because of a misunderstanding of the uncertainty associated with the flood crest predictions. Since the flood, both countries have reviewed and are planning to strengthen their primary structural defenses.

From the standpoint of fostering strong resilience over the long term, both countries have trouble with the role of structural measures. In Manitoba, for example, there are no requirements to floodproof property in an area that is enclosed by a ring dike—many of which were built during recovery from the 1997 flood. Similarly, in the United States, areas "protected" by levees are removed from the 100-year flood hazard designated on the map, thereby lifting both the flood insurance purchase requirement and the pertinent building regulations for those areas.

In Manitoba, the construction of ring dikes, funded from the 1997 Flood Proofing Program, was a typical mitigation measure taken after the flood. But the procedures and financial support for future maintenance of the dikes has been a continuing source of concern for the Rural Municipalities. This differs from the situation in the United States where, as a condition of receiving its planning, design, and construction assistance, the U.S. Army Corps of Engineers requires localities to assume full responsibility for the future maintenance of levees and other flood control structures.

Recommendations for Enhancing Resilience in Future Flood Recovery Assistance

The preceding analysis provides the context for the following recommendations that, if enacted, will increase resilience in the Red River Basin. Some of the recommendations apply Basin-wide, others are jurisdiction-specific. They are arranged accordingly.

Basin-wide Recommendations

- 1. Policies and programs that permanently remove structures from floodplains should be promoted.*

If the vacated land remains permanently in open space, buyouts of flood-damaged and/or floodplain buildings appear to be the single most effective way of minimizing future flood losses and helping build resilience in the Basin. In the United States, the policy of providing programs and funding for voluntary buyouts should be continued and even expanded. In Canada, such a program should be considered.

However, it should be a matter of policy in both countries that any funds obtained for acquisition of flood-damaged structures be conditioned upon a strict, permanent prohibition on rebuilding on the vacated lots. If such lands are not kept in open space in perpetuity but instead are eventually sold and redeveloped, the cycle of damage/rebuilding/damage is perpetuated, at taxpayers' expense.

- 2. Recovery, rebuilding, and mitigation expertise and information should be shared across the border.*

Information about recovery and rebuilding techniques specific to the Red River Basin should be shared between the United States and Canada. One vehicle for doing this would be the formation of technical assistance teams comprising experts on cleanup techniques, draining and reconstructing basements, molds, and the design and building of ring dikes. These teams could serve as consultants to localities, give workshops for homeowners, or perform other similar services after a flood. Another useful mechanism would be the development of a Basin-wide database of technical and other information related to recovery, mitigation, and flood resilience, accompanied by lists of sources where additional information can be obtained. This database could be made widely accessible, through public libraries or the Internet.

The need for such information is particularly acute in Canada. The federal government has failed to provide technical criteria for buildings located in floodplains. The explanation provided for this omission has been that such criteria are not necessary as people are not supposed to build on floodplains! In an ideal world, such may be the case. But in reality, particularly in Manitoba, a large number of buildings have existed for quite some time within the floodplain. If the historical pattern continues and the buildings remain on the floodplain, then resiliency can only be improved if the buildings are modified to reduce the potential for flood damage. A readily available database of effective alterations could provide the basis for such modifications.

3. Establish an ongoing monitoring system for resilience levels in the Red River Basin.

Snow loads, water levels, ground absorption capacity, and other indicators of the degree of risk from a given hazard are routinely measured in the Basin, but indices of resilience, such as the extent of occupancy of the floodplain, number of insured households, sales tax revenues, and health of riparian ecosystems, are not. This lack of knowledge handicaps efforts to build flood-resilient communities. Monitoring such factors not only would contribute to the identification of problems and deficiencies in individual and community resilience, but also it will help establish a baseline against which future progress can be measured. Resilience is not static, and monitoring would need to be done routinely to capture the ebbs and flows in the Basin's status.

4. The way in which currently defined levels of acceptable flood risk relate to long-term resilience needs to be examined.

This is a perplexing policy issue for both countries. Over the long run, is obtaining 210-year flood protection with the Grand Forks/East Grand Forks levee worth the losses that will occur when the greater flood inevitably occurs? In Canada, are ring dikes built to the 1997+2 feet level a good tradeoff for the damage that residents will have to face when the larger flood happens? Both governments need to examine whether such decisions are wise ones. An ancillary question is, Having made such a tradeoff, are the localities truly taking responsibility for their flood risk? That is, are they building self-sufficiency and undertaking to recover without outside assistance in the next flood? This is an especially crucial issue in an area like the Red River Basin, where flood after flood can be expected.

5. Nongovernmental organizations involved in recovery operations should be encouraged to consider how their practices affect resilience and modify them accordingly.

If voluntary agencies and other nongovernmental organizations not traditionally involved in disasters are to play a larger role in disaster recovery, then issues of long-term resilience and techniques and policies for achieving it should be incorporated into their programs for recovery assistance.

Recommendations for Canada

1. Review and improve the delivery of assistance programs.

In Canada, the process of delivering recovery assistance to victims was problematic after the 1997 floods. As a result, the process is being refined. Internal evaluation of lessons learned is occurring and modifications to procedures are under consideration. The process needs to be accelerated and should include an examination of related social support systems and their delivery.

In addition to incorporating the lessons learned from the problems that occurred in the 1997 flood into revised emergency management and recovery plans, both the MEMO and EPC need to develop mechanisms for better inter-provincial communication of effective management strategies and for deployment, possibly inter-provincially, of recovery assistance experts.

To complement this, audits (i.e., expert evaluations) of these plans and public consultations to provide external validation for them are needed. It is essential, if resilience is not to be undermined, that those who might need the assistance in the future help define the processes by which it will occur.

Finally, to prevent recurrence of the situation that occurred in 1997, the process of delivery of financial and technical recovery assistance (and disaster assistance as well) needs to be clearly detailed, and made known to municipalities and residents well in advance of an emergency.

2. *Consideration should be given to the establishment of an insurance scheme in Canada that would make affordable flood policies available.*

Damage from floods is not covered under standard property insurance policies for residential structures in Canada. A 1958 cost-benefit analysis prepared by the Royal Commission reported that a self-sustaining flood insurance program was impractical, although the basis of this conclusion was not fully articulated. In the absence of a systematic examination of the issue, accepting the conclusion ensures that future generations will be exposed to the same debilitating impacts that were experienced in 1997, without the benefit of insurance. Various options for providing flood insurance should be explored and thinking "outside-the-box" should be encouraged. One possibility would be for the purchase of flood insurance to be mandated as part of the annual payments associated with municipal taxes, just as are school board levies. Another example is the way in which automobile insurance is required in Manitoba before a vehicle receives its annual license. The cost is determined by the type of vehicle, the owner's driving record, and the type of protection sought. The cost of flood insurance could be determined by the level of risk, types of personal mitigation actions taken, and the level of protection sought. These are but two of several models that could be explored to determine if a viable flood insurance program—one that avoids the pitfalls seen in the U.S. model—is possible in Canada.

3. *Establish a national mitigation strategy and accompanying broadly defined mitigation programs in Canada.*

In the United States, mitigation programs are guided by a National Mitigation Strategy and are funded by a variety of federal agencies. In Canada, no such arrangement exists to either provide leadership for mitigation programs or provide funding for mitigation measures. The work recently begun by Canada's Institute for Catastrophic Loss Reduction in cooperation with EPC to develop a National Mitigation Policy should be seen through to fruition. Further, consideration should be given to developing and implementing a variety of mechanisms (e.g., funding programs, technical assistance) to apply mitigation programs at the local level.

Recommendations for the United States

1. *Different ways to increase policy coverage under the National Flood Insurance Program should be considered.*

Although it is not technically recovery assistance, flood insurance does influence the rate and degree of recovery after a flood. Therefore, in the United States, more emphasis should be placed on developing mechanisms that will dramatically increase the participation rate in the program. One means of doing this during recovery could be to require flood insurance as a condition of receiving recovery assistance, even for people who live outside of the mapped floodplain.

2. *A more thoroughly integrated approach to mitigation activities should be developed and adopted.*

There is a need in the United States to consider the impact of taking numerous separate mitigation measures without overall coordination. An even more basic question is what activities constitute "mitigation." There was some indication that mitigation measures were encouraged and funded after the 1997 flood in a somewhat piecemeal fashion. To achieve true resilience, an action taken at one site or for one purpose should not have a deleterious impact at another site. The mitigation activities need to be coordinated, not just among federal or other funding entities, but also among federal, state, and local levels. This is one of the points at which state and local mitigation plans, that spell out what the overall strategy is to be, are most helpful. For example, in the case of local stormwater management and drainage, where upgrades or other modifications at one site would have impacts at another location, any given "mitigation" measure should only be undertaken after

examination of the whole system reveals that such action would result in increased overall resilience. In other words, careful consideration should be given to whether all so-called mitigation is necessarily good, or whether definite priorities and strategies should be established.

Recommendations for Future Research

During the collection of the information for this report, it became clear that many additional issues need more detailed analysis so that their impact on resilience in the Red River Basin can be understood. This section summarizes these identified research needs.

- *Research on other aspects of resilience besides recovery assistance for structures.*

The narrow focus of this study—the impact of recovery assistance on the resilience of structures—is but one aspect that influences the long-term flood resilience of communities in the Red River Basin. Other aspects of resilience are just as important, and need to be examined.

Initially, the impacts of recovery assistance on the other components of resilience (see Figure 4) should be explored to determine whether the assistance contributed to or detracted from the ability of individuals, households, economies, and environments to recover from a future flood event. And, the research should be addressed from a variety of angles. For example, what was the impact of recovery assistance on individual victims—did it make them more or less resilient for the future? What was the impact of nongovernmental assistance (both in human and financial resources) on future flood resilience—did it make communities more or less resilient for the future? What might be learned from cost-sharing arrangements? Does the fact that localities in Canada bear a larger portion of the cost of recovery mean that they are more self-sufficient (or are becoming so) than localities in the United States, which pay a smaller share? These are but a few of the many issues that need to be addressed relating to recovery assistance and resilience.

Second, a very important question is how all of the variables mentioned above interact to provide the basis for the Basin's resilience. The collateral evidence obtained in this study suggests that recovery assistance may have differentially affected the variables contributing to resilience. Confirmation or rejection of this possibility is needed so that better recovery assistance programs may be developed and so that the weight of the factors involved in determining resilience may be better estimated.

A related topic for exploration is somewhat the reverse of the question above. How do these other aspects of resilience contribute to flood-resistant communities? For instance, there are many environmental contributors to Basin-wide resilience that need to be examined, such as biodiversity, the health of riparian ecosystems, and the wisdom of using upstream storage, to mention but a few. The contribution of these environmental aspects to long-term flood resilience is not well understood and needs to be examined.

Finally, it is important to study how these other aspects of resilience can be built into the flood recovery assistance scheme. There were a few cases where this occurred in the 1997 flood recovery. Incentives (in the form of rebates) for purchasing energy-efficient furnaces to replace flood-damaged ones were widely distributed in the Greater Grand Forks area after the flood. In addition, the University of North Dakota used recovery funds to do a technical assistance/public awareness project on incorporating energy efficiency, renewable energy, and other environmental technologies into flood recovery and reconstruction. These are just two examples of opportunities for incorporating other aspects of resilience into flood recovery efforts. Research should address how effective such projects are and identify other similar opportunities for testing.

- *Evaluate the effectiveness of the U.S.'s Hazard Mitigation Grant Program in contributing to overall resilience of communities.*

In the United States, the Hazard Mitigation Grant Program should be evaluated, to determine the kinds of mitigation measures that are being funded and implemented, and whether they really are contributing to overall and long-term resilience. Work such as this could contribute to the Basin-wide mitigation database mentioned above.

- *Evaluate prior buyout programs to determine their long-term effectiveness in maintaining open space floodplain areas.*

The buyout programs in Grand Forks and East Grand Forks were not unique in the United States. Similar programs (though different in scale) have been carried out for at least two decades throughout the country. And while it initially sounds promising that localities or states "require that land remain in open space permanently" after a buyout of flood-prone areas, there is little evidence of how long those good intentions last. If the restriction on development is couched in a local ordinance or a zoning district, for instance, it can be lifted sometime in the future, when memories of the flood are long gone, new control structures are in place somewhere, the local economy slumps, or a developer advances an attractive proposal for a new use of that parcel of land. It would be useful to investigate the long-term fate of flood-prone properties that were acquired by public entities some years ago under, for example, FEMA's Section 1362 program, the Corps' nonstructural flood control projects, or through other means. Are those open space areas still open? If some have been redeveloped, under what circumstances?

- *Perceptions of flood insurance should be studied in Canada.*

There have been a number of investigations in the United States of people's perceptions of flood insurance. A recent survey of Grand Forks residents, for example, was conducted to determine how aware they were of the availability of flood insurance, and what influenced their decision to purchase or not purchase it (Pynn and Ljung, 1998). The findings were generally in line with those of prior studies: most people knew about flood insurance and considered it affordable, but thought that they did not need it, either because of their location in relation to the river, because they believed that the levee and other control devices would protect them, or because they relied on forecasts of the river crest that later proved too low. An understanding of perceptions on the Canadian side is needed as well. Such knowledge would delineate the constraints on the viability of flood insurance options that might be considered as recommended in the section on Canada above, and it might inform policymakers how to avoid misperceptions.

Another approach to tackling this question would be to determine the scope of commercial flood insurance coverage in Canada. In the 1997 flood, many commercial operations did have flood coverage, but there is no detailed information about it. A study should be undertaken to assess the number and extent (of coverage provided) of policies in place, the number and amounts of claims filed and paid, any changes in the number of policies purchased or insurance premiums charged as a result of the flood, and the rationale of business owners for carrying flood coverage. The findings of such a study could contribute to the development of an affordable flood insurance program for homeowners.

- *Ascertain the most appropriate architecture for the Red River Valley.*

Much of the flood damage in the Basin was due to the predominant housing style—one or two-story homes on full basement foundations, with basements used as living space. Long-term resilience would be fostered if housing more appropriate to the flood risk were the norm. The challenge lies in finding what "appropriate" means. The extreme temperature variations in the Basin coupled with other hazards such as tornados and blizzards means that homes in the Basin must be

resilient to a variety of environmental conditions. Consideration should be given to inventing a new architecture: The Red River Valley House. One means of promoting this would be to sponsor a competition among architecture students at the University of Manitoba and North Dakota State University to develop a design for a flood-resistant house suitable for the climate, soils, and other characteristics peculiar to the Basin. The winning design could become a prototype for more widespread housing development in the area. Moreover, the concept could be expanded to include a separate competition for designs to retrofit existing structures so that they would be more flood resistant. Besides generating multiple ideas for building better structures, the competitions could also serve as starting points for enhanced public awareness and understanding of mitigation techniques.

- *Evaluate the National Flood Insurance Program and the Flood Damage Reduction Program.*

Both Canada and the U.S. have federal programs that provide some guidance for floodplain management at the state, provincial, and local level. The National Flood Insurance Program in the United States was created in 1968, and Canada's Flood Damage Reduction Program was established in 1975. Neither program has been thoroughly evaluated to assess its impacts on their respective countries' vulnerability, losses, and resilience. In addition, the impacts of certain elements of the programs should be examined. For example, should regulations for floodproofing or flood-resistant construction be removed when an area is "protected" by a flood control structure? Conclusive evidence as to the effectiveness of the various aspects of the two programs, after two-to-three decades of implementation, is needed. The programs, which have similarities and differences in their approach, could be comparatively assessed to ascertain cross-border lessons.

APPENDIX A

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APPENDIX B

Chronology of Project Events

The Red River Recovery Assistance Assessment Team comprised two major groups:

U.S. Team

Mary Fran Myers, team leader
Jacquelyn Monday
Janet Rex
Eve Passerini

Canadian Team

Bob Tait, team leader
Tom Booth
Emdad Haque
Moti Rahman
Deborah Gural

Advisors to the team included David Etkin and Ian Burton.

The team coordinated its efforts through meetings, conference calls, and sharing of information via e-mail. Generally, the literature search and interviews to characterize recovery assistance took place from October 1998 through February 1999 while March and April 1999 were devoted to analysis and writing. Specific events over the course of the study period took place as follows:

October 3, 1998	Coordination meeting in Winnipeg, Manitoba
November 3, 1998	Conference call with project team
November 30, 1998	Conference call with project team
December 21, 1998	Conference call with project team
January 14, 1999	Conference call with project team
February 4, 1999	Conference call with project team
March 5, 1999	Draft review meeting in Grand Forks, North Dakota
May 4, 1999	Myers/Tait meet with the Red River Basin Task Force in Grand Forks, North Dakota

APPENDIX C

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APPENDIX D

Questionnaires Used for the Interviews

October 26, 1998

STANDARD QUESTIONS ABOUT RECOVERY ASSISTANCE FOR FIRST ROUND OF CONTACTS (U.S. Side)

The purpose of this project is to find out about the recovery assistance that was both provided and received by various federal, state, local, and private entities and individuals in Grand Forks, North Dakota, and East Grand Forks, Minnesota, after the 1997 floods on the Red River.

1. What type of recovery assistance did you/your group provide/administer/receive after the 1997 floods? [(a) financial assistance, (b) technical assistance, and/or (c) "other"]
 - (a) For financial assistance,
 - (1) How much was it?
 - (2) From whom did it come? [what agency, organization, etc.]
 - (3) To whom was it given? [homeowners, municipalities, etc.]
 - (4) What form was it in? [grant, loan, matching, etc.]
 - (5) Were there conditions attached to it? If so, what? [required matching funds or contribution; administrative requirements; other restrictions]
 - (6) Was the purchase of flood insurance required as a condition of receiving this financial assistance?
 - (7) Briefly describe the process used to distribute/administer the funds.
 - (8) What was the money used for? Was there a designated purpose?
 - (9) Are there records or reports of the financial assistance that we could access and/or get a copy of?
 - (b) For technical assistance
 - (1) What kind of technical assistance did you provide/receive?
 - (2) From whom did it come/to whom did you provide it? [what agency, organization, categories of individuals, etc.]
 - (3) How or in what form was it provided/received [on-site visit, telephone, written materials, ongoing consultations, etc.]
 - (4) What was the goal of the technical assistance?
 - (5) Are there records or reports of this assistance that we could access and/or get a copy of?
2. Were there instances in which you (or the people to whom you offered recovery assistance) turned that assistance down, because the loss or need was already covered by insurance?
 - (a) Was it insurance under the National Flood Insurance Program, self-insurance, or privately obtained insurance? [private insurance would include sewer-backup or business interruption policies, for example].
 - (b) Was there anything in the recovery assistance process that would cause you to change your mind about or reconsider your need for flood insurance in the future, or the extent of your coverage, or the way you insure yourself?

If so, describe it.

If not, can you imagine anything about the recovery assistance process that WOULD have changed your mind about insurance?
3. May we contact you again if we need more information about the recovery assistance you were involved with?

STANDARD QUESTIONS ABOUT RECOVERY ASSISTANCE
FOR FIRST ROUND OF CONTACTS (Canadian side)

The purpose of this project is to find out about the recovery assistance that was both provided and received by various federal, state, local, and private entities and individuals in the RM of Ritchot and the suburb of St. Norbert, after the 1997 floods. American researchers are doing a similar investigation in the area around Grand Forks. When we are finished, we will be comparing the recovery programs of the two countries to see what their strengths and weaknesses are and what each country can learn from the other.

1. What type of recovery assistance did you/your group provide/administer/receive after the 1997 floods? [(a) financial assistance, (b) technical assistance, (c) social assistance, and/or (d) "other"].
 - (a) For financial assistance,
 - (1) How much was it?
 - (2) From whom did it come? [what agency, organization, etc.]
 - (3) To whom was it given? [homeowners, municipalities, etc.]
 - (4) What form was it in? [grant, loan, matching, etc.]
 - (5) Were there conditions attached to it? If so, what?
[required matching funds or contribution; administrative requirements; other restrictions]
 - (6) Briefly describe the process used to distribute/administer the funds.
 - (7) What was the money used for? Was there a designated purpose?
 - (8) Are there records or reports of the financial assistance that we could access and/or get a copy of?
 - (b) For technical assistance,
 - (1) What kind of technical assistance did you provide/receive?
 - (2) From whom did it come/to whom did you provide it?
 - (3) How or in what form was it provided/received [on-site visit, telephone, written materials, ongoing consultation, etc.]
 - (4) How was the technical assistance used? [Were the materials really distributed? How? Did anyone come to the floodproofing open house?]
 - (5) Are there records or reports of the technical assistance that we could access and/or get a copy of?
 - (c) For social assistance,
 - i. What kind of social assistance did you provide/receive?
 - ii. Was this kind of social assistance part of your activities prior to the flood? Is it a reaction to the flood, or was it a planned expansion of your organization?
 - iii. From whom did it come/to whom did you provide it?
 - iv. How or in what form was it provided/received [on-site visit, telephone, written materials, ongoing consultation, etc.]
 - v. What did you do to keep families together or to support the activities of families?
 - vi. Was there a mental health/educational component to the assistance?

- vii. was there a community building component to the assistance? Please describe.
 - viii. Are there records or reports of the technical assistance that we could access and/or get a copy of?
- (d) "other,"
- (1) Describe the other assistance you provided/received.
 - (2) From whom did it come/to whom did you provide it?
 - (3) How or in what form was it provided/received [on-site visit, telephone, written materials, ongoing consultations etc.]
 - (4) What was the goal of the recovery assistance?
 - (5) Are there records or reports of this assistance that we could access and/or get a copy of?
2. Were there instances in which you (or the people to whom you offered recovery assistance) turned that assistance down, because the loss or need was already covered by insurance?
- (a) What was the source of the insurance?
 - (b) Was there anything in the recovery assistance process that would cause you to change your mind about or reconsider your need for insurance in the future, or the extent of your coverage, or the way you insure yourself?
If so, describe it.
If not, can you imagine anything about the recovery assistance process that WOULD have changed your mind about insurance?
3. May we contact you again if we need more information about the recovery assistance you were involved with?