"Planning for Canadian Disasters:

Some of the Problems, Some of the Answers"

Prepared for Emergency Prepardness Canada

by

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PREFACE

The field of human behavior in disaster was conceived in Halifax, Nova Scotia, Canada in December, 1917.

The father was Samuel Henry Prince, a graduate student in Sociology at Columbia University in New York City. His topic was the response to the December 6, 1917, Halifax explosion.

The result was a book, "Catastrophe and Social Change," Prince's Ph.D. dissertation, the first systematic study of disaster.

Samuel Henry Prince was a Canadian, a native-born Haligonian and he had come back to Halifax to do his research. (He already had an M.A. from the University of Toronto.)

The Halifax disaster intrigued him because he was interested in relief - he had earlier been involved in assisting victims from the Titanic - so, urged on by his supervisor, Franklin Giddings, he decided to study what happened in Halifax.

Looking back, we now know some of what Prince stated was probably not correct.

Earlier scholars, notably Gustave Le Bon, had written that in a crisis man reverts to a primitve state. Le Bon had been influenced by the French revolution and he saw the problems of disaster as similar to social unrest.

Prince referred to Le Bon and he quoted some journalistic accounts of looting and anti-social behavior which seemed to support what Le Bon had suggested.

But Prince was an extremely careful scholar and his account of the Halifax explosion can now be seen for what it was: an extremely accurate picture of the response to disaster, a picture which shows that disaster behavior is, on the whole orderly, altruistic, admirable. (Some of the journalistic accounts he quoted were simply not accurate.)

We have learned a great deal since Prince finished "Catastrophe and Social Change" in 1920.

There have been studies done in the United States, Japan, Italy, Australia, Sweden, the United Kingdom. There has also been a fair amount of research in Canada..

This document - designed to provide an overview of the real world of disaster - is based on all that research. It is based especially, however, on the 48 field studies conducted

by the Emergency Communications Research Unit (ECRU) at Carleton University, a unit that has been in action since 1970 and has been funded by Emergency Preparedness Canada (EPC) and the agencies which preceded it.

The document itself was done on a contract between EPC and a private consulting firm, Scanlon Associates Inc. It was made possible partly because the senior author, Joseph Scanlon, was on sabbatical at the world's most active Disaster Research Center at the University of Delaware, not least because the DRC has the world's best disaster library. But it was made possible most of all because over close to two decades, EPC, through men like Burke Stannard, has made it possible for the authors to learn - from actual contact - about the reality of disaster.

On July 31, 1987, Edmonton was hit by a devastating tornado.

In just an hour, homes and businesses were ripped apart, toxic chemicals were spilled, phones and power were knocked out, there was severe flooding, 27 persons were dying or dead and between 300 and 400 were injured.

There was some warning - the weather office had issued a tornado watch - but many who heard it ignored it. Edmonton has no history of tornados. At the Evergreen trailer park - later worst hit of all - those in the office laughed when a man said a tornado was coming.

Emergency agencies ran into many problems.

Transportation routes were blocked. Heavy rain and a broken sewer had led to flooding which blocked many underpasses. Other streets were blocked by downed power lines and debris including smashed vehicles.

Communications were in disarray. Police, fire and transit radios were jammed. The ambulance radio tower had been hit by lightning. Some phones were out. It was at least 14 minutes before anyone from the trailer park could reach a phone and call for emergency help.

Unhappy choices had to be made. Firefighters had to decide whether to deal with toxic spills or help the injured.

Most of the injured went to hospital on their own or with friends, neighbors or even strangers. Hospitals had no idea where their patients were coming from.

As time passed, the response was increasingly organized.

The damaged areas were searched and re-searched until it was certain no one was left trapped.

The injured were treated at hospital, usually with little delay.

The homeless found a place to stay.

Within 70 hours, those needing any kind of help could go to a a special "one stop" social service centre designed to cope with all the victim's emergency needs.

The people of Edmonton lined up to donate food, clothing and other things to assist the victims.

What happened in Edmonton is typical of what happens in a disaster in Canada or anywhere else.

There may or may not be warnings; if there are, they are often ignored .

There is devastation.

Communications systems jam.

Individuals cope and help each other. They dig themselves out of wreckage, find transportation, get themselves to hospital. They go to relatives or friends rather than public shelters if they need accommodation.

Organizations have more problems. Because of the damage, because communications are disrupted, because people have acted on their own, they find it takes time to sort things out.

Eventually, however, things get organized, a process which takes place much faster if there is experience and/or good planning.

Even with planning, communications among organizations can be difficult. Many planners think of disasters as large emergencies: it's hard without experience to grasp the magnitude and nature of a catastrophe.

CANADA'S DISASTER EXPERIENCE

On December 6, 1917, there was an explosion in Halifax harbor larger than any other man-made explosion until the atomic bomb.

On November 9, 1978, there was an evacuation in Mississauga, Ontario, larger than any peacetime evacuation in history until some more recent evacuations as a result of earthquake threats in China.

In 1914, the Empress of Ireland sank in the St. Lawrence river with a greater proportion of passengers lost than on the Titanic.

Major disasters do happen in Canada.

There have been mine disasters - a series of them in one community, Springhill, Nova Scotia.

There have been tornados - not just in Edmonton but also Regina, Sarnia, Woodstock, Barrie and scores of smaller communities.

There has been one devastating hurricane - Hazel - which left its scars on Toronto.

There have been earthquakes one which led to a tidal wave which took 27 lives in Newfoundland..

There have been forest fires including one took hundreds of lives along the Miramichi in New Brunswick and another which wiped out several communities in northern Ontario.

There have been floods, trains wrecks, plane crashes, mudslides and rockslides.

There have been scores of snow emergencies.

But - in most cases - these incidents, especially the serious ones, have not repeated themselves in the same place.

Other hurricanes have threatened - one a few years ago looked as if it would create a storm surge at high tide in the Bay of Fundy - but they haven't hit.

Only Regina has been hit twice by a tornado and the second tornado (50 years after the first one) was not severe.

And while some communities have had repeated floods, they have usually not been severe.

The result is most Canadians have experience either with one disasters or with none at all.

That means they probably believe one of two things:

1. If a disaster happens it will be just like the last time (and that probably means not very serious); or

2. Disasters don't happen to their community.

Because of that they are likely to discount a disaster warning no matter how reliable the source. Because of that they are uninterested in taking the precautions needed to prevent disaster.

When the city engineer in Cambridge got a flood warning from the Grand River Conservation Authority, he went to bed without telling anyone. Floods occur regularly in the Cambridge area; but they are never that bad. He did not expect this one to roll down the main street waist high.

Radio stations in Toronto were equally sceptical when the weatherman told them Hurricane Hazel was a serious threat. That was just not believable. Hurricanes don't happen in Toronto.

There are exceptions.

Firefighters and police in Courtenay, British Columbia, had

two toxic incidents just weeks apart. They knew what to do when a third occurred a couple of months after that.

Airport staff, police, firefighters and hospital staff in Gander, Newfoundland, had dealt with two commercial air crashes since World War II. They knew what to do when the third one (256 dead) happened on December 12, 1985.

Sociologists call this sort of disaster-relevant knowledge - the knowledge of what to do that existed in Courtenay and Gander - disaster subculture. All the term means is that particular agencies or a particular community has had sufficient disaster experience that people in those agencies or in that community have grown accustomed to disaster; and have learned how to deal with it.

It is easy, for example, in tornado alley in the United States (where tornados are a frequent experience) to get the public to react to a siren and a tornado warning over the radio.

It is easy in British Columbia communities like Pemberton or Princeton - where there are frequent floods - to get the public to support spending money on dikes.

But a subculture can also be a problem.

If people are convinced the next incident will be just like the last one, then they may act in ways that are not appropriate. That's what happened to the engineer in Cambridge. He was convinced, wrongly, the next flood would be a minor one, just like its predecessors.

Disaster subculture explains why some in Pemberton discounted the fire department's warnings of an oncoming flood. They lived behind dikes: they were protected. They didn't expect the water to come in from the other direction.

In Canada, however, the real problem is the absence of any developed disaster subculture.

It is difficult to get Canadians to react to warnings about floods or hurricanes or tornadoes or to prepare for such events because they have no experience. They don't believe disasters happen in this country.

Canada even dropped out of the North American tsunami warning system - tsunamis don't happen in Canada - just before Port Moody, B.C., got hit by a tsunami after the 1964 Alaskan earthquake.

The lack of a disaster subculture means emergency planners can not count on regular disaster experience to prod people into accepting the need for disaster planning. Planners have

to find other ways to stimulate community learning and preparation.

MYTHS

Although a disaster subculture based on experience does not exist in Canada, another sort of disaster subculture probably does.

Research done in the United States by Dennis Wenger and others suggests most persons - both the public and officials - have a set of beliefs about disaster based on media.

The research also suggests these beliefs are inaccurate.

People believe for example people will panic in a disaster. Yet panic rarely occurs in disasters.

But because the media believe in the myth of panic, they sometimes act as if that myth were true. They hold back important information because they don't want to alarm people. Officials do the same.

In the small British Columbia mill town of Port Alice, no one sounded the fire siren when a mudslide hit for fear of causing panic. Yet in that same town a quick sounding of the mill's alarm helped every worker escape safely when there was a leak of chlorine.

The real problem in disaster is not panic. The real problem is often the opposite. There are too many people, too much communication, too much materiel. People and officials tend to converge on the scene rather than go away from it.

Time and time again agencies call for all available staff not realizing that their problems will be an overload rather than a reduced supply. They don't consider that if everyone gets involved at the start there will be no one rested and refreshed ready to carry on when the disaster hits its second, third, fourth, fifth day.

In Pemberton during the floods, the fire chief ran the whole response system day after day after day. He did a magnificent job. But, eventually, he collapsed from sheer exhaustion.

Panic isn't the only myth.

People believe that given widespread destruction or a widespread evacuation there will be theft, looting. The fact is looting rarely occurs. During disasters, crime rates usually fall. Yet police instead of trying to cope with the real problem, convergence, sometimes devote their resources to a less serious problem - looting.

People believe the victims will be dazed, disorganized, in shock., needing assistance from cool, rationale, well-organized officials.

The truth is close to the opposite. People. including victims, cope quite well in disasters. They may believe the myths but they don't act that way. They often resent strangers coming in and trying to tell them what to do.

Organizations often don't do so well.

Because of damage, because of convergence, because of communications problems, organizations often find it difficult to establish precisely what has happened and therefore what they should do about it. They also tend to react in line with the myths: they act to prevent panic, stop looting. They rush in from outside to help because they think people can't cope.

Some will challenge these statements: they will say there is panic and looting in disasters. That is true but they are rare events.

First, flight behavior - running from danger - is not inappropriate and it's not panic. If something is about to blow up the best move may be to get away. That's common sense. The Chinese have a proverb, "there are 36 ways to behave; the best is to run."

Running isn't always the best solution. In Bhopal India persons near the chemical plant ran when the leak occurred. But they ran in the direction of the cloud, to where gas concentrations were greatest.

Their behavior was wrong; but it wasn't panicky. What they did was the most logical thing to do.

Real panic seems to occur only when there is limited time to run and limited escape routes - as, for example, during a fire in a crowded theatre with just one exit. Even then, for the individual, the behavior is rationale.

Knowledge can help avoid panic. People try to squeeze out the one exit because it's the only one they know: it's the way they came in. If they knew other safe escape routes they would use them.

A study of a Japanese night club fire showed the patrons died because they tried to get out through the fire - the only route they knew. The staff, better informed, lived - by escaping through the kitchen.

Looting sometimes occurs, too.

There was some looting in Sydney Nova Scotia after a windstorm and a couple were caught looting in the trailer park in Edmonton after the July 31 tornado. And it did occur in New York City after the power blackout.

But we're talking about a few incidents.

Looting does, of course, occur in another sort of event - a riot. But when it does happens, the looters like the rioters are local people, not outside agitators, and the violence is not random: it's aimed against specific targets.

Disasters affect everyone. That's why everyone wants to help. Riots, in contrast, result from community conflict. It's not surprising violence occurs.

Large crowds incidentally don't necessarily breed violence. Studies of the family crowds during the Pope's visit to Canada showed the behavior was anything but unruly. The police couldn't have asked for better cooperation.

LEARNING ABOUT RISK

The first problem in preparing for disaster is overcoming the belief "it won't happen here."

It was a failure to recognize the danger of munitions ships in Halifax harbor, for example, which led to Canada's worst disaster - the Halifax explosion.

It was failure to recognize a collision was imminent which took the Empress of Ireland to the bottom of the St. Lawrence river in 14 minutes on May 28, 1914.

It was failure to accept the evidence that put Edward J. Smith as captain of a major liner:

. on June 21, 1911, Smith's ship, the Olympic, had cut off the stern of a tug, the Hallenback, in New York harbor;

. on September 20, 1911, Smith's ship, again the Olympic, had been in collision with a Royal Navy cruiser near Southampton. (An inquiry held Smith and the Olympic responsible.)

But Smith's company still made him captain of the Titanic.

There are many examples of warning signs being ignored.

In North Bay, Ontario, for example, a building reeked of the smell of natural gas for three hours before it blew up with eight dead, 23 seriously injured.

> when we smelled the gas, we opened some windows to When we first smelled the gas it wasn't that strong but it kept getting stronger and made my stomach feel sick....
>
> I went to the workmen and said, "`Hey, this place is filled with gas.'" ... They said..., "`It's not that bad. There is a little odor but it's not that bad.'"

In Port Alice, British Columbia, there were so many signs of a mudslide the mayor was even on the phone discussing the possibility when the slide hit. Yet no one was warned before the slide hit.

In Terrace, B.C., there was heavy rain, unusually warm temperatures, melting snow - all the signs of flash flooding before the floods hit and knocked out the gas line, the rail lines, the highways. Yet none of the emergency agencies prepared for the oncoming disaster.

Are these findings unusual? Definitely not.

Researchers in all parts of the western world have found a remarkable capacity to ignore threats:

. in California persons interviewed about hazards mentioned all sorts of things before earthquakes:

> 2.4 per cent....mentioned earthquakes.... Problems such as crime, cost of living, taxes, unemployment, smog and pollution, transportation, crowding, and education and busing all come to people's minds before they think of earthquake danger.

In England persons living in a flood plain seem unaware of the dangers involved.

> in the lower Severn Valley, only some 9 per cent. of those citing disadvantages mentioned flooding, whereas 21 per cent. mentioned poor provisions of buses and other community services.

In Darwin, Australia, a city often hit by cyclones, many ignored a very precise warning another - as it turned out - devastating cyclone was about to hit.

Sometimes warning systems fail. But most of the time warnings fail to operate because of human failure. Making persons aware they are in a hazardous environment may be the most difficult task of all in disaster preparedness.

Detection incidentally should not be confused with warning. Noticing there is a problem is essential. Telling people about it is essential, too.

WARNING

Even if the risk is spotted and a warning issued there can be some problems:

1. The awareness of the danger or the warning may come too late;

2. There may be technical problems in issuing a warning;

3. It may not be clear what should be done.

When the first earthquake to hit New Brunswick in 60 years struck no warning was possible. The quake came from a previously unnoticed fault and there were no preliminary tremors.

When a nursing home in Goulds, Newfoundland, caught fire, there was no time to warn anyone. The home was engulfed in fire in four minutes: all 21 residents died.

When a major storm hit the Pacific off west coast Vancouver Island, the weather office issued the warning after some fishermen were already commited to round the north tip of the island. The wind and waves (20 metres high) prevented them from turning back.

Even if time is short, a warning can be effective. In tornado alley. the area of the United States frequently hit by tornados, it takes only seconds for persons hearing a warning siren to take cover. They know the threat; and they know what to do.

That does not mean the time problem can always be eliminated.

So far only the Chinese have successfully predicted earthquakes. When the big one comes in British Columbia or California, it will likely come without warning.

Even if there is time for a warning, technical problems can block that warning from being disseminated.

Twice in the last decade tornados have hit Ontario cities without an effective warning being issued

Before both the Woodstock and Barrie tornadoes, the media in those communities went off the air because of power failures. In neither community was there back-up emergency power for radio or TV. There was no effective public warning system left.

There was also a technical problem before a fishing disaster off west coast Vancouver Island. Problems with

equipment including satellites had delayed the forecast.

(A similar technical failure blocked an accurate forecast of the windstorm which hit southern England in October, 1987.)

The third problem is options: the danger may be known; the proper response may not be.

When bush fires hit Tasmania, residents were told to leave their homes. Some of those who did died when their cars were caught in fires along the highways. The homes they had left remained unscathed.

That's one of the reasons why, in 1985, police warning residents during a forest fire in New Brunswick declined to force them to move. It wasn't clear moving was the best thing to do.

The problems of options also exists in relation to toxic chemicals or nuclear radiation; and it exists when there is a forecast, such as an earthquake prediction.

If there is a leak of toxic gas from a nearby plant, the best response is to stay indoors, windows closed and wait for the gas to pass.

(At least that may work in Canada: in Bhopal - with homes without without adequate windows - staying at home often proved fatal.)

If there is an earthquake prediction - especially one with a low probability - officials are not sure whether to warn people or not. There's a genuine fear too many warnings that don't turn out will make people unwilling to respond when the situation is more certain.
The problem is known as the "cry wolf" syndrome.

It's not an imaginary dilemma.

When the Fort Garry Court apartment caught fire in Winnipeg in 1074, many residents stayed in the burning building even though the alarm went off and people could hear and see the fire department responding. There had been so many false alarms they had stopped believing. Five people died in the fire.

EFFECTIVE WARNING

When Mississauga was evacuated, Peel Regional Police were very specific about what the problem was and what they wanted people to do. And they tried to make sure the same message came through on every possible channel: they had uniformed police officers at every door; they had police with public

address systems repeating the same message; they made sure the media were broadcasting exactly the same thing.

The Peel Police knew the criteria for a truly effective warning:

1. It must be specific about out the cause of danger;

2. It must be specific about what to do about the threat;

3. It must be reinforced i.e. come from more than one source;

These conclusions come largely from the research of a Canadian psychiatrist J. S. Tyhurst who studied the Noronic disaster (s ship fire in Toronto harbor).

If warnings aren't specific - both about the danger and about what to do - people will become confused and uneasy. After all, different threats may require different action: going to your basement may make sense in a tornado, it's hardly the logical action in a flood.

People also want to check when they hear something, especially something alarm. They'll ask family members. They'll look to see what their neighbors are doing. They'll turn on the radio or TV.

If the various sources aren't in unison they'll be reluctant to act. If other people aren't reacting, they'll feel silly reacting on their own.

That means that a missing source or a source with contradictory information can be damaging.

That's exactly what went wrong in a community on the United States-Mexico border. The mayor issued a flood warning and had it publicized by the sound truck normally used by the local drive in theatre. Thee truck also advertised that night's drive-in movie. Inevitably, listeners discounted the warning.

That's what went wrong in North Bay when the office building filled with gas. The occupants could smell the gas but they did not want to over react especially when gas company workmen were telling them everything was all right.

They stayed. Eight died, 23 were injured when the building blew up.

A good warning requires one other element: ideally it will be based on public knowledge acquired through education. If people know about tornadoes or flooding or gas leaks, they

are more likely to respond to the signs of danmger.

IMPACT

When the French munitions ship, the Mont Blanc, blew up in Halifax harbor, there was the blast itself and the shock waves which tore through the community.

There was the tidal wave which swept through the harbor.

There was the aftermath of falling, burning debris - which set the city on fire.

Samuel Henry Prince, the Canadian who was the first to do systematic disaster research, described it this way:

> Trees were torn from the ground. Poles were snapped like toothpicks. Trains were stopped dead. Cars were left in tattered masses. Pedestrians were thrown violently into the air, houses collapsed on all sides. Steamers were slammed against the docks. There followed a virtual air-raid when the sky rained iron fragments on the helpless city.

When Cyclone Tracy hit Darwin, Australia, almost all homes were destroyed, the water system was knocked out, all power and telephones were out, all communications systems within the city were out and the streets were so blocked with debris, movement was difficult to impossible.

The driver bringing the general heading the relief expedition to Darwin couldn't even find police headquarters. The damage was do bad he couldn't tell which street was which.

At the hospital, staff were baffled when no patients arrived for treatment once the cyclone passed. They did not know the debris prevented that.

Only part of Edmonton was hit; but the problems were similar. Police, firefighters and ambulance personnel had to abandon their vehicles and climb over debris as they worked their way into devastated areas. Emergency personnel working in the same general area didn't know others were nearby.

In Edmonton, part of the flooding - it knocked out a section of the light rail transit system - was caused not when a sewer exploded but when it imploded. The tornado had sucked the air out of the sewer.

In Barrie - after the tornado - the destruction was so widespread that it took to the next day to determine precisely what areas had been hit. (The only helicopter had responded to an earlier tornado elsewhere.)

Devastation makes it difficult for emergency agencies to respond. They can't get around. They can't communicate. They can't find things.

It helps explain why disasters aren't just large emergencies: they are something completely different.

And that's just one of the problems.

CONVERGENCE

When a downtown office building filled with gas then exploded in North Bay, Ontario, there was an immediate response from emergency agencies. Police, firefighters. ambulance drivers and others rushed to the scene.

Since the explosion had resulted from gas and had damaged other utilities, along with them came power workers, gas company staff, telephone service personnel.

Soon - because of the chaotic situation which developed -these were joined by public works employees (to put up barricades) and tow truck operators (to remove vehicles from the impact area.)

Added to that were the curious.

The building explosion took place when many persons were either in the downtown area or (because schools were just out) passing through.

Many of those who saw or heard the explosion felt compelled to tell others either in person or, more often, by telephone. Within two minutes, the telephone system was jammed.
Many others wanted to see for themselves. Within 10 minutes, 6,000 persons, one sixth the city's population, was on site.

All these activities - the movement of emergency equipment, the movement of people, the jamming of telephones - are known as convergence phenomenon. Convergence is one of the reasons emergency response can become difficult.

Convergence can be a major problem in disasters. It can so tie up communications systems - phones and radios -they simply can't operate.

It doesn't take damage to create convergence.

After the Miramichi earthquakes, so many people used the phones in Bathurst, New Brunswick, the downtown phones were jammed for half an hour. Yet there was no damage.

After the train derailment in Mississauga, so many persons went to the scene the first responding police inspector found himself in a rare Saturday midnight traffic jam.

Panic or flight is not the problem in disaster. It's the reverse - and it's called convergence.

Not all aspects of convergence are bad.

In the early stages of an emergency response - especially if there is extensive damage and communications are disrupted - it's individuals acting on their own who help those in need.

In North Bay, for example, among those 6,000 who rushed to the scene were some members of the public who (with some police officers) climbed onto the debris before it caught fire and pulled some of the victims to safety.

Convergence can be difficult to handle.

At the trailer park in Edmonton, police, trying to keep persons out of the devastated area, learned later some of those they had turned away had been kept from going to see dead or injured relatives. One lady who was not allowed in lost her husband and three children when the tornado hit the trailer park.

But convergence can result in too many people, too many agencies, all trying to help, all getting in each other's way. It helps explain why social service agencies - like the Red Cross and the Salvation Army - sometimes fight at disasters.

They all respond, often without being asked. They all want to help. They can easily clash with others doing the same thing.

Samuel Henry Prince noted this - he noticed conflict among religious groups - in the wake of the Halifax explosion. William Anderson spotted it again after the Alaska earthquake. Joseph Scanlon reported it in Mississauga.

RELOCATION

Quite often in disaster people act quickly to protect themselves. It makes sense; but it also creates some difficulties.

When a train derailed and caught fire almost in the back yards of trailer park residents in Petawawa, many of the residents fled almost immediately.

They could see the flames and they could see a tank car near the flames. An explosion appeared quite lightly. Running could save their lives.

When police, firefighters and ambulance personnel arrived a few minutes later they, too, could see the same danger. They decided almost immediately the trailer park should be evacuated.

But now there was a problem.

The emergency personnel didn't know who had already left and who hadn't. And there was no one around to tell them. When they knocked on a trailer door, they didn't know if the person was away, had just fled or was, perhaps, deaf.

The evacuation was more difficult because of the immediate reaction of the residents.

Movement towards the scene of a disaster is one problem; movement away from it can be another.

A problem similar to Petawawa developed at the trailer park in Edmonton. Many persons, though initially trapped in the wreckage, freed themselves and headed for medical treatment. When firefighters and later police arrived they were often told by other residents that someone was trapped in the wreckage. They sometimes searched for hours before they learned it wasn't true.

When St. Joseph's Hospital was evacuated in Hamilton, Ontario, during a major fire, the staff, assisted by police and firefighters, rapidly evacuated the hospital. Other staff and emergency workers - including ambulance personnel -got the evacuees to their families or to other medical facilities.

In the haste to get people out of the burning hospital -the evacuation was accomplished very efficiently - no on kept a list of who had gone where. At the day's end hospital staff had to start phoning around to locate some of the missing patients. (All had been properly cared for: it was just that no one knew.)

EVALUATION AND RESPONSE

When New Brunswick was shaken by earth tremors, it was obvious there was an earthquake. But until scientists in Ottawa analyzed the data, it was far from clear where the earthquake was centered or how severe it was.

When a train derailed in Medicine Hat the first police responders had trouble breathing but it was some time before they knew precisely what chemicals were in the burning

wreckage.

Because of damage, convergence and relocation, or simply the lack of immediate information, coping with disaster requires constant evaluation and re-evaluation. Sometimes it's far from clear what has happened.

When the trainn derailed in Mississauga, firefighter and police could smell chlorine and see the exploding propane. But it was much later they learned there was also styrene, toluene and caustic soda.

The initial concern at Petawawa was the possible explosion. Later it became toxic chemicals - sulphuric and muriatic acid - in the smoke.

The initial concern at Gander - when the U.S. charter jet crashed and took 256 lives - was survivors. Then it was looking after the dead and trying to find the cause of the crash.

But, for a time, it was something else. Jet fuel from the plane's gas tanks was contaminating Gander Lake the source of the town's water supply.

When a propane tanker overturned near Courtenay, British Columbia, the first worry was an explosion but there was also concern lest diesel fuel run into the ocean and contaminate the fish population.

Sometimes it is not possible to deal with everything at once. When the first firefighters arrived at the Edmonton trailer park, they were confronted with injured and dying and reports of persons trapped. But they could also see gas-fed flames amid the wreckage. They had to choose.

When officials began to clear away the 10-metre snowbanks after a storm in Prince Edward County, Ontario, they had to choose. All the dairy farmers wanted their roads cleared so they could get their milk picked up. But it wasn't possible to do everything at once. A decision on priorities had to be made.

Sometimes the decisions can only be made step by step as information becomes available.

In Medicine Hat, after the train derailment, police started the first evacuation immediately. They couldn't breath without breathing apparatus: people living nearby simply had to be moved.

Later - after some thought - officials decided to evacuate a nearby home for the aged. It might take time to evacuate later -if the situation deteriorated - and it was deemed wise

to take precautions.

Later still the mayor ordered a third evacuation, this time of high ground above the wreck. A wind shift had changed the threat.

There were also decisions to set up reception centres for evacuees, to warn persons using breathing support systems they might be in danger, to provide hotel accommodation to those evacuated from the home for the aged, etc.

Disaster response is a series of actions each based on the best available information.

MIND MAP

When a wind storm devastated Sydney, Nova Scotia, one of the first things the mayor wanted produced at the command centre was a map showing what had been hit and what hadn't, what traffic routes were working, which ones were blocked.

It made emergency response a lot easier.

Most persons have a view of the world around them, a view they share with other people who inhabit that same world. That view includes such simple things as the layout of one's own dwelling, the layout of one's place of work and the layout of one's own community.

And it includes such shared knowledge as when rush hour occurs on downtown streets (if there is a rush hour) when stores are closed, where one colleagues go for lunch.

These images - we call them "mind maps" - are essential if we are to relate to others. For when we discuss things - whether it's to take an early lunch or where we'll meet for dinner - we assume we share mind maps.

Mind Maps are important to persons concerned about community services - fire, police service, public works, utilities. It is the mind map which is the basis of discussions about what should be done.

Police used mind maps when they chose the fastest route to an emergency call - and, depending on time of day, they may not always follow the same route.

Firefighters use mind maps when, en to a fire, they plan how they will set up and attack the fire. They know where hydrants are located. They know - from regular block inspections - how major buildings are laid out and what they are likely to contain.

A major problem in disaster is that existing mind maps are

no longer accurate. Damage, convergence, relocation all alter the situation and make existing maps - including mind maps - no longer accurate.

One of the key responses is to create new physical maps so new mind maps can become known and accepted.

Getting the information necessary to do this is sometimes called survey and assessment. That means, in simple terms, finding out, in the wake of a disaster, just what has happened.

In Edmonton, with many traffic routes blocked by flooding, transit authorities moved from major street to major street trying to establish which route could be used for north-south traffic. They were doing survey and assessment.

COMMUNICATIONS

During the Mississauga evacuation, the Red Cross took charge of the reception centres for evacuees. To make sure the various centres could keep in touch, the Red Cross arranged for ham radio operators from the Canadian Radio Relay League to be at each reception centre and at the main command post.

That guaranteed the centres could talk to each other. It also guaranteed police could respond quickly when they were needed - as they were when some drug problems developed at one of the centres.

It dealt with two key problems of communication: within the organization and between it and other organizations.

Enrico Quarantelli in a document prepared for the United States disaster training centre in Maryland has pointed out there are three other communications concerns:

. communications from organizations to the public;

. communications from the public to organizations;

. communications within systems of organizations.

All are significant.

In St. Bonaventure, Quebec, after a tornado, the mayor wanted to tell the public what was going on. St. Bonaventure is a small community with no local media (there was also no power); but the mayor solved the communications problem quite effectively. He typed out the latest news on a manual typewriter, ran it off on a hand-powered duplicator, stuck the resulting notices up on trees and walls.

In Sarnia, Ontario, after a tornado, officials were equally imaginative, They knew most victims were in schools serving as shelters so they went to these schools and announced all the latest news over a loud hailer.

In Corner Brook, Newfoundland, after part of the city was evacuated because of a toxic spill, the police department set up a special phone line for evacuees and announced it over the radio. When they were phone calls, they usually heard about them quickly: someone would always call in.

Many communities - Corner Brook, Port Alice, Pemberton -have discovered one way to get out information and to get feedback, too, is to call a public meeting. It may not work in a big city but it's very effective in a rural area.

When the mayor called a public meeting after the floods and evacuations in Pemberton, B.C., almost everyone showed up, especially when they heard they would have a chance to talk to a provincial cabinet minister.

The system, by the way, worked. The minister, after listening to public concerns, persuaded his cabinet colleagues there needed to be a chance in government policy.

Sometimes the problems aren't so easily solved.

At Mississauga, the Red Cross were able to talk to the police but the police couldn't talk to each other. Although the four departments involved - Peel Regional, Metro Toronto, Ontario Provincial Police and Royal Canadian Mounted Police - are among the largest in Canada, they did not have a common radio channel.

Special arrangements had to be made to accommodate police communications.

In Lower Gagetown, New Brunswick, when a forest fire jumped off Canadian Forces Base Gagetown and threatened a settlement, none of the responding fire departments could to each other, the two police agencies couldn't talk to each other, police could not talk to fire departments, forestry (the agency responsible for fire fighting) could not talk to any of them.

When a forestry fire boss went up in a helicopter he could talk his own crews but not to the municipal fire departments he had called in to assist.

Sometimes in the wake of disaster the problem is not a failure of communications but the fact that the information needed was not previously wanted.

If a hospital is on fire, it's useful to know who's in that

fire. That's sometimes difficult to find out. Hospitals know their patients they don't keep track of visitors (except in critical care areas) of delivery personnel, of salespersons, of persons coming in to pick up drugs, shop, accompany those in emergency etc.

Sometimes it's just that no one asks.

During the fishing disaster off west coast Vancouver Island, the federal fisheries department knew which fishing boats were likely to be in the storm. Fisheries are so closely regulated, they knew months ahead where fishing boats will be. Fisheries didn't share this data with the weather office because they weren't asked.

CO-ORDINATION

Some persons like to equate disaster management to military management - a sort of command and control situation. Information flows up to the persons or persons in charge, decisions flow down to those on the firing line.

In fact, disaster management (and probably military management) involves co-ordination more than command and control. Effective disaster management involves shared information and shared decision making rather than over-all direction.

One reason for the difference is that in the military it's clear - by rank if nothing else - who can tell whom what. In a disaster, the chain of command may be extremely uncertain. Even someone telling someone to leave a threatened area may be on shaky legal ground.

Some command decisions have to be taken. When 50 forest fires were burning at the same time on May 15, 1986, in New Brunswick, the fire control centre in the provincial capital in Fredericton had to decide how to allocate the limited supply of water bombers. No individual fire unit could make that decision: to each unit its own problems seem to require priority treatment.

When a propane tanker overturned by some houses just south of Courtenay someone had to decide just who ought to be evacuated and whether there was the legal power to make them go.

(In this case, the law was clear: police even kicked a door in when they heard someone inside a house: it was fortunate they did; the occupant was a mentally ill person too frightened to respond.)

But often the problem is not command and control but coordination, another word for sharing.

In Edmonton, for example, when north-south traffic routes were blocked by flooded underpasses all emergency agencies wanted to know the precise situation. Sharing made sense. Yet - though there was a central command post - both the police and the transit system set out to find a workable north-south route on their own.

In Woodstock, Ontario, after a tornado, it made sense to search a devastated area several times. It would have made more sense to keep track.

In Princeton, British Columbia, when an ice jam 4.5 metres high was reported approaching the community, it made sense to evacuate low-lying areas. It would have made more sense to share that information at a central command post. That way it would have been discussed and some of the more experienced residents would have pointed out the jam might have been 4.5 metres high in the canyon above town, it was not likely to stay that way on the flat land below.

In many emergencies the various agencies - police, fire, ambulance - can each do their own thing. They work together without surrendering their autonomy.

In disasters, there is a much greater inter-agency dependance.

At Mississauga, for example, the command post needed information about the fire, about the chemicals, about the wind. They needed the transit system (to move people), the ambulance system (to evacuate the hospital), the Red Cross (to look after evacuees). They needed the media to keep the public informed, This required a much higher level of sharing and coordination than would be needed for a routine emergency.

Disasters can also mean agencies have to put aside some of their normal functions.

When Prince Edward County was totally tied up with a snow emergency, provincial police could not possibly patrol the highways or investigate the inevitable accidents.

PLANNING

Emergency planning involves a number of steps: hazard evaluation; development of a plan; testing that plan with those directly involved then with a wider audience; revision of the plan; simulations; public education; constant review of all aspects of planning.

It also involves identifying who will be involved and how they will be reached.

A book by Canadians Ken Hewitt and Ian Burton, The Hazardousness of a Place, describes the hazard history of London, Ontario, and shows is that, to a large extent, history repeats itself.

Over the years. London has been hit with snow storms and ice storms, floods and other hazards. The future is likely to bring the same kind of problems.

Once hazards have been identified, it is also necessary to look at risk. A risk is different than a hazard. A river presents a hazard because it may flood. An earthquake presents a hazard because it can shake the ground so hard buildings will collapse. The ocean presents a hazard because of the possibility of high tides or storm surges.

But the risk from a hazard can change.

With adequate floodways (as in Winnipeg Manitoba), flood levels which in the past would have been catastrophic may no longed be dangerous. With reinforcement, buildings are less likely to collapse in an earthquake. Sea walls or dikes or flood barriers (such as those on the Thames in England) can reduce the threat from high tides or storm surge.

Risk assessment - the evaluation of risk - must take into account not the potential danger (the hazard) but the actual danger (the risk).

Of course, protective action may reduce the risk of a minor event but still not prevent a catastrophe. And it may increase rather than decrease the difficulty of risk communication: people assume a dam or dike will prevent all future disasters.

Once hazards have been identified, it is necessary to develop plans to deal with them. These plans have several essential elements: there must be a way of detecting when a hazard is becoming dangerous; there must be a way of passing that information on to officials and the public; there must be advance decisions about the appropriate responses (so that information can be included in the warning); the agencies responsible for that response must know their roles: the public must know what to do.

While different threats call for different responses - -people may go down to the basements in a tornado but up to high ground in a flood - the plan is the same. Whether it's a tornado or a flood, persons must be warned: the warning process is the same in both cases.

Plans work best when they are tested and tests are useful whether or not they go well. (They force people to think

about emergencies and to work together.)

Of course, it's not a bad idea to have tests or simulations that are realistic. It doesn't make much sense to constantly try out plans with a simulated area crash in a community full of chemical plants.

It is also important planning focus on what does happen, not what those doing the planning would like to happen.

Medical planners stress what is called triage. They envisage medical personnel beinge sent to the scene of an incident to sort out (triage) the injured so those in need of immediate hospital attention can be sent by ambulance to hospital first.

Triage may work in a spot type disaster such as a bus accident, train wreck or plane crash.

It does not work in a widespread incident such as a tornado. In such events most persons go to hospital by themselves. There is no sorting and the ambulances play very little role.

Next, good planing must include the media. Planners must make certain the media (especially radio) have the resources (such as back-up power) to survive during an emergency. They also need to know which media reach which audiences (different cultural and language groups may tune in to different media).

Most plans focus on organizations: it is helpful if there is also some concern about the individual.

Emergency planners sometimes worry that people with emergency responsibilities will abandon them in a crisis. That is another myth. They will worry about their families. They may try to reach tme. But - whether they are police or firefighters, ambulance drivers or nurses, physicians or bus drivers, utility workers or broadcasters - they will do what they are supposed to do.

There's a strain involved if someone - no matter how responsible - if worried about spouse and children or parents or others who are close. It's easier if that worry can be set aside.

That's why a good starting point for organizational planning is an attempt to get individual members of those organizations to have plans for their own family. Knowing that plan is in place can make other responsibilities less onerous.

Even a simple fire plan for a home - everyone agrees where

they will meet if they have to evacuate at high speed - can decrease anxiety and decrease the chance a parent will risk his or her own life to rescue a child who is already safe.

Emergency planning may be a federal, provincial and community and organizational responsibility; it starts with the individual.

STRESS

When St. Joseph's Hospital in Hamilton, Ontario, had to be evacuated because of a fire, some of the elderly patients actually enjoyed the experience.

Often alone - except for nurses, physicians and occasional visitors - they were suddenly the centre of attention noy only of hospital staff but of police officers, firefighter, ambulance attendants and others concerned about their welfare. Life, so often routine, had a new exhiliration.

Disasters obviously cause some stress.

There is the stress just mentioned on officials who they are worried about their families while they carry out emergency duties.

There is the stress created by the persistent demands of emergencies: most persons can carry on only so longer before they shows signs of fatigue.

There is the stress created when individuals can't do what they normally do and when they have to work with others, perhaps giving up some of their normal jurisdiction.

There is the stress to the victims themselves. It is stressful to lose one's home or one's posessions, to lose one's family and one's friends. to o suffer serious injury.

There is the stress created simply by uncertainly: the thousands of phone calls from anxious persons which flow into a disaster area indicates this sort of reaction.

But, as in the case of the elderly hospital patients, the picture is not one-sided.

Because disasters are so all-encompassing, some persons find that, while they are involved in the disaster, other problems fade for a time.

There are some who argue that it is critical - in the wake of disaster - to assist those who have been involved and that includes response personnel as well as victims. There are others who say post-disaster stress may be just normal stress - it just happens to take place in the wake of

disaster. Most persons who show signs of serious problems had those problems already.

There is one place where everyone agrees.

It is unquestionably stressful - no matter how much experience you have - to be confronted with a lot of severely injured people and with dismembered bodies. The research available suggests even experienced emergency physicians and police used to dealing with grisly accident find mass casualties hard to handle.

If there is stress, it is likely to show up at certain times. One of those is usually the anniversary of the disaster.

MITIGATION

One way to deal with the threat of disaster is mitigation.

Mitigation can be done in three ways.

The potential damage of disaster can be reduced or stopped by devices such as dikes (to prevent floods) or earthquake resistant buildings (to minimize the effects of earthquakes) or tornado shelters in the basements of homes (to provide a safe place to hide when a tornado strikes.)

Or it can be done by trying to make sure persons are exposed to danger e.g. by preventing persons from building in flood plains.

Finally, mitigation can be accomplished by plans which guarantee that when disaster does strike the effects are minimized. That can include a good warning system and a good evacuation plan and it can include a plan by industry to move equipment for example above an oncoming flood.

Civil defence - the idea that precautions can be taken which will at least reduced the effects of war - is another form of mitigation.

Because Canadians are convinced disasters won't happen, they aren't interested in preparing for them; and they certainly don't want taxes spent on such a low priority.

Building support for mitigation action requires the same sort of process as building an understanding of what to do given a disaster. People must first be convinced it can happen. Then they must be told what could be done about it.

MEDIA

Like most organizations, the media are part of the problem in dealing with disasters.

They tend to respond in large numbers, tieing up telephones and emergency officials, using such needed resources as rental cars and hotel rooms. At the Coalinga earthquake in California, so many responded by helicopter they created an air traffic jam above the disaster.

Since they focus on problems - the injured, the dead, the damage - they tend to distort reality: persons seeing disaster reports on TV often assume communities have been destroyed when damage is only in specific areas.

(The Mexico City earthquakes did not hit most downtown buildings. But telecasts focused on those which were hit.)

Their questions may well be inappropriate. Reporters tend to ask about numbers - how many injured, how many dead, how much cost - when officials are far more worried about such things as: is everyone getting treated; have the homeless been taken care of; if everyone is rescued.

The media also sometimes start the process of scapegoating - trying to find someone to blame, someone responsible.

And one of the biggest problems is that they, more than anyone agency, are responsible for perpetuating the myths. If they can't find panic they report (in surprise) it wasn't there. If they can't find looting, they will report the precautions to prevent it.

They will even stage events to show what they insist on believing is the way it is: at Three Mile Island, for example, they asked people to get off the streets so they could show people had fled. After all that's the way it had top be.

Yet the media can play a crucial role at all stages of a disaster.

They are the single best way of reaching a large population in a hurry. That is true both at the warning stage and after impact.

The means they are, for example, the single best way to control rumors: to stop a rumor get the media to report it and report that it isn't true.

When rumors started after a windstorm in Sydney that the the ferry had sunk en route from Port aux Basques to North Sydney, the mayor scoteched the rumor by sending a roving radio reporter to interview the captain. When the interview was broadcast live, the rumors stopped.

They are also the way by which outsiders get an image of what has happened.

Canadian research suggests that, to some extent, both provincial and federal response to disaster is shaped by the picture painted by the media especially television.

If the media are absent, their services are sorely missed. Officials in places such as Woodstock and Barrie, Ontario, when the media went off the air before tornados struck -found that without media public information was difficult. Officials in Darwin Australia became so anxious to communicate by radio they flew in transistor battery radios on the first relief flight.

SOCIAL SERVICE

Some agencies do the same things during disasters they do at other times.

Transit companies move people: they may be police or firefighter, evacuees or injured victims but they are still passengers and they are still going from one place to another.

Medical personnel still treat the injured. There may be more of them and some choices about priorities may have to be made but the essential - good medical care - stays.

That's not so true for social workers.

It's certainly true most people won't seek social assistance.

When a fire left everyone in a somewhat derelict building in Winnipeg without accommodation, 50 per cent. of the victims (many of them on welfare or unemployment insurance) found a place to stay the first night. Only a handful accepted help after one night in social service accommodation.

When 217,000 persons were evacuated in Mississauga, just 12,000, roughly five per cent. used social service accommodation. And, as in Winnipeg, many moved out and looked after themselves when the evacuation dragged on.

No matter how bad the disaster, most persons usually look after their own needs.

But it's also true that, in a disaster, some persons will be seeking help for the first time. That may well mean they

are uneasy and embarassed.

Dealing with them will require special tolerance.

They will need sustenance and food, covering and clothing, shelter and accommodation. And - given Canadian conditions -they will need it quickly.,

Arangements for such things are often forgotten when disaster plans are being put together. Everyone agrees there may have to be an evacuation. No one remembers dealing with evacuees requires planning, too.

Occasionally, those doing the evacuating - usually police or firefighters- are familiar with the need for social service arrangements, In Corner Brook, after a toxic spill, police told evacuees to go and register at a specific school. In Mississauga, the Red Cross was advised quickly enough, police could tell the first evacuees there was a place for them at the Square One shopping centre.

Most of the time that doesn't happen. Social service planning is injected too late.

During the New Brunswick forest fires, the evacuating agencies weren't aware until many persons had left there were facilities available to receive them.

Sometimes those who want to help don't know where the victims have gone.

After a fire in Winnipeg, the Red Cross, anxious to assist the evacuees, advertised to find them. (The ads weren't entirely successful: many of the evacuees did not understand English.)

LEADERSHIP

While co-ordination rather than complete command and control may be the correct formula during a disaster, it appears from the research that good planning -- which makes co-ordination possible
- results from effective leadership.

When an attempt was made to classify the various emergencies studied by ECRU into those which had good overall response and those that didn't the ingredient that distinguished the first from the second was leadership., leadership before the event, leadership which had seen to it that good planning had taken place.

In Medicine Hat, during a train derailment, the various municipal agencies worked well together (operating from a

pre-designated off-site command post) because the mayor had insisted on emergency planning and assigned someone to do that planning.

The agencies also had a good place to work from: an emergency operations centre - complete with phone lines and radio jacks -was already set up in the basement of police headquarters.

In Corner Brook, despite a faulty start (it was two hours before anyone made an evacuation decision after a major gasoline spill) there was again good overall co-ordinated response again because the mayor had seen the need for a plan and had got someone to create it.

Things also worked better because the Royal Canadian Mounted Police (RCMP) turned their radio system over to those responding to the disaster.

At the Gander air crash, the response was well organized because the RCMP had an effective on-site plan and because the airport manager had developed and constantly rehearsed a well thought out off-site one.

And, once again, there was good communications: there were several communications links between the crash site and the off-site command post.

Leadership and planning will not eliminate all the problems. Gander still had difficulties with body bags (the RCMP and the airport both ordered them then - after hearing what the other had done - cancelled the order), Medicine Hat with public information (the mayor approved an expanded evacuation without telling the city clerk, responsible for public information) but planning does ensure difficulty is kept to a minimum.

Leadership during the disaster also comes easier if agencies know in advance who is in charge. A disaster is not the time for a debate about who takes charge.

In Courtenay, when the third toxic spill hit, police immediately expected fire to take charge. That had been worked out in advance.

In Medicine Hat - at the train derailment - it wasn't so easy. The city's plan said fire could take charge in a toxic incident but not that they had to. When firefighters got involved in other things, a police sergeant took charge at the site.

THE FUTURE

No disaster plan will work for ever.

As times change, so do disasters. And there are several reasons why this is true.

One is population movement.

As people move into areas threatened by earthquakes, floods. tornadoes or other threats, they increase the possibility these events will cause problems. The 1987 Edmonton tornado would have had much less impact 50 or even 25 years ago. Much of the area it hit was not built up then. The trailer park did not exist.

Another is changing habits.

Shipping disasters are much less likely now than they were at the time of the Empress of Ireland because fewer people travel by ship. The chance of many dying in an air crash has risen because the use of airplanes has risen.

(That does not mean air travel is unsafe just that the frequency of air travel makes air accidents possible.)

Hazards change, too.

Three Mile Island or Chernobyl could not have happened until nuclear power became a reality. Bhopal was possible only because of new developments in chemicals.

The North American power blackout - triggered by a problem in Niagara Falls, Ontario - was possble only because of interlocking technology.

Hazards also change location.

The creation of a new chemical plant or a new transportation for chemicals can alter the threat to the surrounding area.

The impact of hazards is changing.

There's evidence radiation from Chernobyl has threatened the reindeer in Lapland, perhaps threated the life of the whole area.

Finally, people's ability to cope with disasters can change.

There was a time when rural Canadians expected to be isolated and self-sufficient in the winter. They stocked up on provisions and fire wood and coal oil and they had everything they needed to survive.

Now they have electric power and regular deliveries of gas

or oil so they no longer need to stalk fire wood. They have electric power so they don't need coal oil. They have a car or truck so they don't stock supplies: they just drive to a nearby store.

An incident such as a snow emergency - once not much of a threat - can leave them without heat or food. They may also be unable to call for help: the telephone - reliable as it is - can overload or break down in a snow emergency.

Because disasters change, plans must change, too.

Enrico Quarantelli has warned:

...planners show a strong tendency to rely too heavily on past experience rather than to make projections about what might happen in the future. It is often said that generals learn how to fight very well under conditions presented by the last war, but not an upcoming one. The same can be said of some disaster planners.

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