

RISK PERCEPTION AND KNOWLEDGE GAP BETWEEN EXPERTS AND THE PUBLIC : ISSUES OF FLOOD HAZARDS MANAGEMENT IN CANADA

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ABSTRACT

The goal of this research was to assist in improving the decision-making process of flood disaster management in the Red river basin of Canada, through a better understanding of risk perception and the knowledge of both experts and the public. The findings of the 1997 Red River flood in Manitoba, Canada case study have revealed that the institutional efforts aimed at reducing risk and vulnerability at the local level are likely to be successful if experts or decision makers are aware of how local residents perceive risk. This study attempted to examine and identify the differences or gap that exists in risk perception between 30 public respondents and 12 flood experts in the Red River basin, through a modified version of the Delphi method. The results of the study revealed that the gap between the public and experts concerning risk perception is not as significant as the literature suggests. However, a gap does exist concerning the mutual understanding between experts and the public, and a deficiency in risk communication between them is clearly recognized. Institutional initiatives to address risk communication problems, particularly to reduce flood loss, are therefore required.

Key Words : Risk perception, Flood, Hazard, Disaster, Management, Experts, Public

INTRODUCTION

In the 20th century alone, twelve provinces and territories of Canada have experienced 168 flood disasters¹ caused primarily by hydrometeorological mechanisms (snowmelt runoff, storm-rainfall, rain-on-snow, ice jams) acting either individually or in combination. Flooding in Canada has resulted directly and indirectly in the deaths of at least 198 people and at least \$2 billion in damage during the last century. Several studies have confirmed that there has been a general increase in the magnitude of flood events in the second half of the 20th century, relative to the first half, along many Canadian rivers.² Between 1975 and 1999, 63 floods resulted in federal government payments of approximately \$720

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million under the Disaster Recovery Financial Assistance Arrangements program.³

Preventing flood damage through better understanding the public and experts' flood risk perceptions, as well as through information and knowledge sharing, are important elements of flood management. It has been suggested in the relevant literature that there remains a significant gap between the general public's knowledge and perception of risk and the experts' risk perception related to flood hazards. Risk perception can be defined as people's beliefs, attitudes, judgments and feelings, as well as the broader social or cultural values and dispositions that people adopt, towards hazards and their benefits. Public risk perceptions and attitudes are closely related to the current level of risk reduction and to the strict regulation employed to achieve the desired

reduction in risk. However, experts often fail to take into account the knowledge domain of a community audience. Their highly interconnected, extensive domain of specific knowledge makes it difficult for specialists to anticipate the wholly different perspective of the community residents.⁴ Differences between experts' and public opinions suggest that the public conceptualizes risk more broadly than the expert, whose notion is narrow and therefore likely to miss something of importance to the local community.⁵ Margolis⁵ argues that, in fact, what accounts for the stubborn conflicts is related less to what experts see and which other people miss, and more to what ordinary people feel about risk and which experts neglect.

Scientists and policy makers often both agree that the public has a tendency to react emotionally or subjectively to complexity and is often incapable of appreciating the uncertain and complex nature of environmental issues.⁶ The public, on the other hand, tends to criticize experts (scientists and policy makers) for using inaccessible, technical language and for failing to provide clear and complete answers.⁷ These problems highlight the gap that exists between the public and experts and the need to improve the understanding of risk perception between the public and the experts.

Shrubsole *et al.*⁸ surveyed the floodplain residents to assess their perceptions of flood hazards and adjustments to floods in Canada. Generally, residents did not perceive a significant risk of future flooding. There was a poor understanding of floodplain regulations, and structural engineering adjustments were viewed as the most effective approach. Thus, although floodplain regulations were supposed to be the most effective mechanism in reducing future flood damages, residents preferred other measures. In addition, the public commonly displayed a variety of misunderstandings and confusions, and even very well-educated individuals tended to conceptualize flood hazards issues differently than scientists and specialists. Such an approach tends to neglect the concerns or beliefs held by the public, leading to a general distrust and lack of confidence in the prevailing institutions, thus creating a gap between the public and experts' domains. The 1997 Red River basin flood was the flood of the 20th Century

in the region and deserves special attention to test the prevailing notions about flood risk perception, with a focus on the juxtaposition and gaps between floodplain residents and experts/policy makers.

STUDY AREA

The Red river basin in southern Manitoba, Canada occupies an extremely wide and flat floodplain (the total drainage area of the Red River is 290,000 km²). It experienced severe floods in 1950, 1979, 1996 and 1997.³ The Red River originates in South Dakota, USA and flows north, forming the boundary between North Dakota and Minnesota, USA (**Fig. 1**). The 1997 Red River flood was the area's largest in 135 years, forcing the evacuation of 28,000 people, and causing more than \$500 million in estimated damage.⁹ The 1997 Red River basin flood demonstrated that efforts aimed at reducing risk and vulnerability at the local level are less likely to be successful if decision makers are not aware of how risk is perceived at the local level.¹⁰ Accordingly, the International Red River Basin Task Force expressed the need for social research to improve the understanding of the immediate and long-term effects of flooding on residents in the Red River basin.¹¹ The International Joint Commission (IJC) supported this and recommended that governments in the basin facilitate research to improve the resiliency of the public to floods.

AIMS AND OBJECTIVES

In formulating effective disaster management strategies, it is critical to understand how different stakeholders perceive risk and make decisions. By attempting to identify the gap between the public and experts who act as decision makers, the goal of this study was to assist in improving the decision-making process of flood hazards management.

The specific objectives of this research was to: (1) assess the nature of perceived risk at both the local level (i.e., among floodplain residents) and institutional level (policy makers/experts) ; (2) determine if there is any variation between perceived risk among floodplain residents and institutional experts; and (3) assess options for addressing possible gaps between floodplain residents and experts.

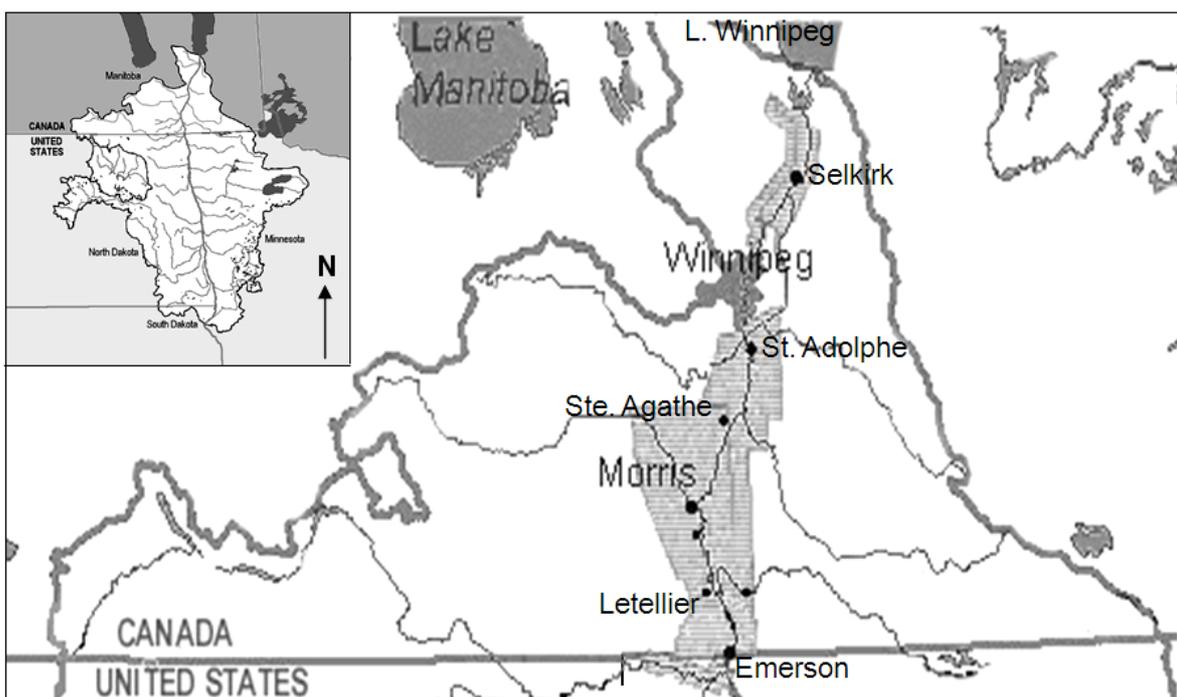


Fig. 1 : Locating map of study area

METHODOLOGY

The primary region and scope of the study was limited to the Manitoba (Canada) section of the Red river basin. The study involved a total of 42 participants, comprised of 30 Flood Area Residents and 12 Institutional Representatives. A survey of floodplain residents from within Winnipeg and from southern Manitoba provided the primary data used to examine perceptions of the public. In addition, a survey of institutional representatives provided the data used to examine the perceptions of experts. The principal method utilized for this research was a modified version of the Policy Delphi method utilized by de Loe and Wojtanowski.¹² The Delphi method is intended to structure the group communication process for the purposes of problem resolution.

Delphi Phase One (P1) involved preliminary face-to-face interviews that were used to determine and identify the pertinent issues surrounding flood management, without the researcher prompting the discussion, in order to ensure the success of the subsequent mail-out portion of the Delphi Process. A total of 42 interviews were conducted over a period of three months, with a semi-structured instrument.

Delphi Phase Two (P2) of the study utilized a combination of identified issues derived from the Phase One interviews, as well as literature issues deemed pertinent by the research team, to create a total of 42 booklet format surveys, used to determine initial positions on the synthesized issues and assess the underlying reasons for agreement or disagreement with the statements. Both P2 and Phase Three (P3) of the research involved conducting two separate, but simultaneous, Delphi surveys with experts and the public. The experts were asked more specific and knowledge-based questions while the public was asked less technical and more subjective questions.

Delphi P3 of the research, the final phase, consisted of a survey in booklet format similar to the one developed in Phase Two. Each page of the survey contained one original statement carried forth from the Phase Two survey. The intention was to allow respondents to review the original statement, as well as to view and reflect on the collated group responses to the statement. The overall response rate from the Phase One through to Phase Three of the Delphi Process was 36 out of 42 (86%). The response rate can be further broken down into 28 out of 30 for the public (93%) and 8 out of 12 experts (67%).

RESULTS AND DISCUSSION

A common belief, frequently cited in risk perception literature, is that after a low probability, high magnitude event, the public will generally perceive that another equivalent event in their lifetime is unlikely and therefore tend to misjudge the risk as low.¹⁰ This is based on the idea that the errors that cloud subjective perceptions often arise from the use of heuristics which can be

fallible and can lead the individual away from a true understanding of the objective risk that is external to human cognition.¹³ One commonly cited example is that the public tends to perceive that when a 1 in 100 year flood event occurs, it may mean that a flood of equal magnitude would not reoccur for another 100 years.

The survey results, shown in **Table 1**, over two rounds of surveys (that is, P2 and P3), indicate

Table 1 : Distribution of public responses to the statement that a flood equal to or greater in magnitude than 1997 will not occur in my lifetime (Percentage)

Likert Scale Responses	Delphi Phase 2N=28	Delphi Phase 3N=28
Strongly agree	32	43
Agree	39	43
Disagree	11	11
Strongly disagree	0	0
No comment	18	0
Total	100	100

that perceptions exhibited by much of the public did not differ significantly from the objective risk typically conceptualized by experts. The public generally disagreed with the statement that a flood equal to or greater in magnitude than 1997 would not occur in their lifetime. The public did not display a tendency to underestimate the risk as the literature traditionally suggests.^{10,13}

The research results further revealed that expert knowledge and perception of flood risk did not rely solely on scientifically assessed patterns and probabilistic calculations. Many elements of expert decision-making involved subjective personal judgements. Since a 1997 level flood had not been experienced in more than 100 years, the magnitude of the required response was not anticipated by the authorities and many plans were adjusted throughout their implementation.¹⁴

Expert risk assessment and decision-making has traditionally been based on rational, objectively calculated measures of probability, whereas the public's perception has been viewed to be based on more subjective estimates of risk. Slovic et al.¹⁵ first introduced the concept that experts' judgement appeared to be prone to many of the

same biases as the public, particularly when they were forced to go beyond the limits of available data and rely on intuitions. The findings from the Delphi Process of the present study support the concept put forward by Slovic et al.,¹⁵ revealing that both experts and the public often utilize subjective factors in their decision-making concerning disaster management.

The outcomes of the Delphi process further revealed the existence of a gap between experts and the public in other areas; specifically, there is a lack of understanding regarding the public's issues and concerns. In general, the experts indicated that they believed that local residents' perception of flood risk is distorted and they are not properly aware of the objective risk. As indicated in the data presented in **Table 2**, the majority of the expert respondents believed that flood frequency is not easily understood by some floodplain residents. However, experts were found to be undecided as to whether local communities receive information that is too technical and complex in nature.

A conspicuous finding of the present study is the variation, between experts and the community

Table 2 : Distribution of expert responses to the statement that flood frequency is not easily understood by some floodplain residents (Percentage)

Likert scale responses	Delphi Phase 2N=8	Delphi Phase 3N=10
Strongly agree	20	12
Agree	60	63
Disagree	20	25
Strongly disagree	0	0
No comment	0	0
TOTAL	100	100

residents, in knowledge and perception of the implementation of the mandatory evacuation procedure during floods. Many local residents insisted that because of the losses caused by the 1997 flood, and in part due to the mandatory evacuation, in future floods, similar evacuation orders would likely be defied. Most public respondents indicated that besides ensuring that their immediate family was safe, the foremost priority was the protection of personal belongings and their homes. In comparison, half of the expert respondents expressed reluctance to comment on the given statement, suggesting that there is disagreement within the expert community on this issue.

The above findings are indicative of the need for a two-way exchange of information to aid the communication process. One expert expressed that institutions should be required to know what it is that local residents find too complex about risk communication, while others noted that increased education and communication in plain language would aid the process. Rather than a gap concerning risk perception existing between residents and experts, it appears that a more significant and important gap is associated with the lack of communication and understanding between floodplain residents and experts/policy makers.

CONCLUSION

Many policy analysts and social scientists warn that by ignoring public perception, disaster and emergency managers may underestimate the potential input into the decision-making process that the public is capable of providing. Flood and

other disaster planning authorities should consider how people and organizations are likely to act, rather than expecting them to change their behaviour to conform to the plan formulated by established organizations. This denotes that disaster and emergency planning can never truly be effective unless it is based on a valid understanding of human perception and behaviour.¹⁶

The present study found that while a gap does appear to exist between the public and experts, it does not stem from a significant difference in their risk perceptions and awareness of flood risk. The public respondents in the Red River basin of Canada indicated that at the local level there is an experientially derived awareness of the physical factors that contribute to flood risk and a general understanding that large floods similar to 1997 will reoccur. Also, responses from the experts indicated that an element of subjectivity is often involved in their decision-making process. In conclusion, the key to developing a successful disaster management plan is to find a balance between technocratic and social aspects of interventions in a way so that the population's perception reflects the real risk and they are prepared to deal with uncertainties that may arise. People must be motivated to take the preventative actions necessary to minimize personal, structural, and economic losses caused by disasters.

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