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Chapter 7

NATURAL HAZARD RESILIENCE: THE ROLE OF INDIVIDUAL AND HOUSEHOLD PREPAREDNESS

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INTRODUCTION

The definition of resilience adopted in this book describes it as a capacity to draw upon personal and social resources to manage the consequences of disasters. During the period of disaster impact, people may be isolated from external assistance and have limited, if any, access to normal community and societal resources and functions for several days. Under these circumstances, their capacity to adapt will reflect their level of preparedness (e.g., knowledge of hazard impacts, the protective measures and resources they put in place to assist their adaptation) and their capacity for self-reliance (Lasker, 2004; Paton, 2003; Smith, 1993).

Protective measures (e.g., securing fixtures and furniture, securing a house to its foundation) can reduce the risk of damage and injury. Other resources (e.g., stored food and water, a household emergency plan) facilitate coping with the temporary disruption that accompanies hazard activity. Given that disasters can strike with no or very little warning, unless prepared in advance there will be neither time nor opportunity to acquire the requisite knowledge or resources during the period of impact. Despite the attention and financial resources devoted to its achievement, the goal of ensuring sustained levels of adoption of protective measures in communities susceptible to hazard conse-

quences has proved elusive.

It has become increasingly apparent that neither living in areas susceptible to hazard impacts nor just providing people with information on hazards and their consequences exercises a significant influence on preparedness (Burger & Palmer, 1992; Duvall & Mulilis, 1999; Gregg et al., 2004; Lasker, 2004; Lindell & Perry, 2000; Lindell & Whitney 2000). By drawing upon their recent work (Cowan, McClure, & Wilson, 2002; Hurnen, & McClure, 1997; Johnston et al., 2005; McClure, Allen, & Walkey, 2001; McClure, Walkey, & Allen, 1999; McIvor & Paton, in prep; Paton, Kelly, Bürgelt & Doherty, in press; Paton, Smith & Johnston, 2005; Paton & Bürgelt, 2005) the authors account for this by discussing how people interpret their relationship with the civic, social and natural environments, and make decisions about the adoption of protective measures accordingly.

Constructing Reality

People are not passive recipients of information. Symbolic interactionism (Blumer, 1969) suggests that people actively and constantly interpret stimuli from the environment while interacting with the elements in that environment, and integrate the interpretations through a process of reflection with already existing mental models. People thus construct the meaning of the things they interact with and then act towards them in ways consistent with these meanings.

How people interpret the world (reality) differs from person to person, changes over time, depends on context, and reflects the unique experiences they have accumulated during their lives (Bowers, 1988). The diversity of this experience means that when people interact with the environment they take different objects into account and interpret and integrate them differently (Blumer, 1969). In addition, since individuals constantly assimilate new experiences, their sense of self, their interpretations and their actions constantly evolve over time, with this process defining how people adapt to new conditions (Denzin, 1992). The ultimate function of interpretations is to adapt as well as possible to changes in the environment.

However, peoples' interpretations and actions are always contextual and influenced by the social structures they encountered in everyday life (social context) (Blumer, 1969). The social structure affects how people act, because it defines situations in which people act, and

"supplies a fixed set of symbols which people use to interpret their situation" (Blumer, 1969, p. 86). These conditions, which can become taken for granted, can either constrain or facilitate certain individual interpretations and actions. With regard to disaster preparation, this makes it important to accept that people interpret information in a context defined by their experience, beliefs and misconceptions about hazards, the actions proposed to mitigate their adverse consequences, the information available and its sources (Dow & Cutter, 2000; Lasker, 2004; Paton, 2003). Bostrom, Fischhoff, and Morgan (1992) noted that the interpretation of information can contribute to misunderstandings about hazards. They argue that if these misconceptions are not corrected, information will be neither received nor acted upon in the manner anticipated by disaster planners. This is becoming an increasingly important issue.

Communities are becoming increasingly diverse, resulting in the social context in which information is received being characterized by correspondingly varied experiences, beliefs, needs and expectations. A failure to accommodate this diversity can diminish the capacity of mass media information dissemination, which characterizes much contemporary risk communication, to facilitate the adoption of protective actions (Paton et al., 2005; Johnston et al., 2005; Paton & Bürgelt, 2005). These authors found that community members commonly perceived the disaster-related information presented to them as not specific enough. Consequently, it failed to help them understand either complex hazard issues or why specific actions on their part were required to mitigate them. Consequently, the information made available failed to motivate actions that would assist adaptation to hazard consequences. Problems can also arise if information fails to consider existing interpretive frameworks.

People have been found to overestimate their knowledge of what to do in the event of a volcanic eruption (Paton et al., 2000) and assume levels of preparedness that are discrepant with actual levels (Charleson, Cook & Bowering, 2003; Lopes, 2000). Overestimates of preparedness can also result from inferring from participating in training for more "routine" hazards (e.g., fire drills at school or work) a capacity to respond to more serious natural hazards (Gregg et al., 2004).

Differences about what constitutes adequate preparation have also been noted. Paton & Bürgelt (2005) found that residents' beliefs

regarding sufficient preparedness for bushfires ranged from just mowing the lawn regularly to implementing multiple preparedness measures. They also noted differences in beliefs regarding when protective actions should be adopted. While some people habitually instigated actions at the commencement of the fire season, others put precautions, which could have been implemented earlier, in place only when faced with proximal factors–when dangerous weather conditions (hot, dry, and windy) and bush conditions prevailed, or when fire was perceived as a direct threat to their property. While information on protective measures is available during this period, opportunities for comprehensive protection are unlikely within the short time frame afforded by such beliefs about preparedness. Furthermore, the high levels of stress likely to prevail at this time may reduce the efficacy of such action. The point is, if people base their decisions on beliefs that existing levels are sufficient or wait until certain proximal cues are present in their environment, they are less likely to attend to risk information. Households that overestimate their preparedness for hazard events on any of these grounds will reduce their perceived risk, their willingness to attend to new information, and their perceived need for any additional preparation (Lopes, 2000; Paton et al., 2000).

Pre-existing meaning systems characterized by hazard-related anxiety can reduce peoples' willingness to attend to risk communication or act on it. If people manage their anxiety by insulating themselves from information that triggers feelings of anxiety, the likelihood that they will prepare will diminish (Duvall & Mulilis, 1999; Lamontaigne & LaRochelle, 2000; Paton et al., 2005).

People are not passive recipients of information, even when it is intended to inform them about significant issues in their environment. People make judgments about the information presented to them and actively interpret it within frames of reference that can differ systematically from their scientific and civic counterparts who develop and deliver risk messages. People interpret information in a context defined by their expectations, experience, beliefs and misconceptions about hazards, the actions proposed to mitigate their adverse consequences, and the sources of information (Dow & Cutter, 2000; Lasker, 2004; Paton, 2003), with people actively evaluating the relevance of information for them accordingly. This can result in their being disinclined to attend to information or to interpret it in ways that differ from that intended by civic agencies. Hence, to facilitate the adoption

of protective measures, it is important to understand how people interpret their relationship with hazards and how they interpret hazard information.

If the interpretive mechanisms can be identified, this knowledge can be used to design risk reduction strategies to encourage the sustained adoption of protective measures. One approach that has proved promising involves conceptualizing how people interpret their relationship with hazards and the actions required to protect them as a social cognitive processes (Duval & Mulilis, 1999; Grothmann & Reuswig, in press; McClure et al,. 1999; 2001; Paton, 2003). Paton et al. (2005) demonstrated that the adoption of protective actions results from people successfully negotiating a sequential series of decisions that describe their relationship with a hazardous environment. Using this process as a framework, this chapter reviews issues that inform how people make decisions about whether or not to adopt protective measures. The components of this decision-making process are summarized in Figure 7.1. Discussion commences with consideration of factors that motivate people to prepare.

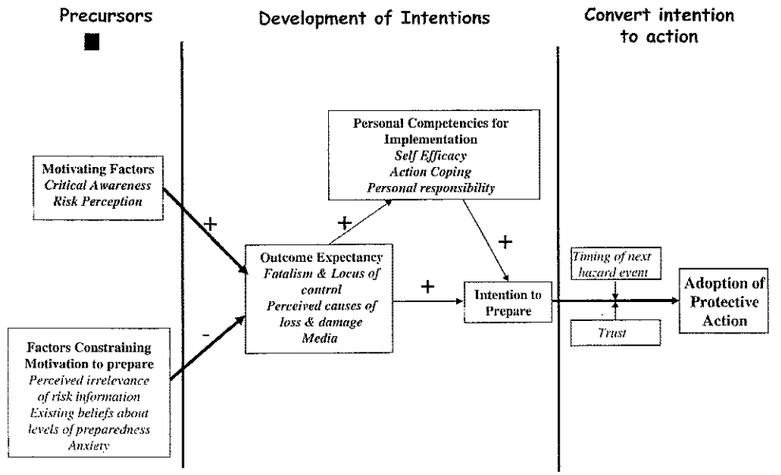

Figure 7.1. The preparedness process. Adapted from Paton et al. (2005).

STAGE ONE: MOTIVATION TO PREPARE

The preparation process commences when people are motivated to confront hazardous aspects of their environment. Two prominent motivators influencing preparing are threat/risk perception and critical awareness. It is to a discussion of these two factors that we turn now.

Risk Perception

Unless a person perceives a threat or risk associated with hazard activity it is unlikely that they will be motivated to deal with it. This is why encouraging the perception of a threat is often the focus of risk communication, with the use of this approach being based on the assumption that informing people of the threat posed by a hazard will result in their doing something about it. However, conveying information about the likelihood of hazard activity occurring and its consequences is not a straightforward process. Civic and scientific sources, who design risk communication programs, derive their judgments from relatively objective assessments of likelihood of occurrence and consequences. They typically assume that citizens will either do likewise or will accept their information at face value. This assumption is unfounded. Peoples' interpretation of risk may not share the relative objectivity that characterizes expert analysis. Rather, their understanding of and response to risk is determined not only by scientific information about risk, but also by the manner in which this information interacts with psychological, social, cultural, institutional and political processes. Reasons why peoples' estimates of risk can differ from their civic counterparts is illustrated by discussing how cognitive biases and social processes influence this discrepancy.

Firstly, risk perception can be influenced by people making judgments derived from comparisons with "other people" rather than on a more objective assessment of environmental threat. When asked to rate their preparedness relative to others within their community, individuals often believe themselves to be better prepared relative to the average for their community. This statistical anomaly, known as unrealistic optimism bias, means that while people may accept the need for greater preparedness, they perceive it as applying to others but not to themselves (Burger & Palmer, 1992; Paton et al., 2001). That is, they

transfer risk to others within their community. If all members are making similarly biased assumptions about the distribution of risk within a community, the need for action will be attributed to others, with personal motivation to prepare being diminished accordingly.

Secondly, a discrepancy between expert and citizen estimates of risk can reflect citizens' tendency to overestimate the capacity of hazard mitigation strategies to eliminate a threat. This overestimation reflects the operation of an interpretive bias known as risk compensation (Adams, 1995). This process has also been known as levee syndrome. This construct describes how people maintain a balance between the perceived level of safety proffered by their environment and the level of risk manifest in their actions and attitudes. Thus, a perceived increase in extrinsic safety (e.g., the fact that hazard monitoring and structural mitigation are being undertaken by civic agencies) will decrease perceived risk, reducing motivation to prepare. For example, the dissemination of information on structural mitigation to the public (which assumes that peoples' behaviour will remain constant) has been linked to reduced levels of both perceived risk and preparedness in household, and an increased likelihood of citizens transferring responsibility for their safety to civic authorities (Hurnen & McClure, 1997; Paton et al., 2000).

Thirdly, relative to objective estimates, citizens' perceptions of risk can differ because they base their estimates on the relationship between hazard activity and personally salient issues. Bishop et al. (2000) and Paton et al. (2001) found that the level of risk attributed to salinity and volcanic ash hazards respectively was determined less by hazard characteristics per se and more by the extent to which hazard activity directly affected peoples' livelihoods. Information on the hazard itself may thus not be meaningful enough to motivate action.

Finally, the likelihood that expert and citizen estimates of risk will coincide depends on the degree to which citizens are actively involved in decision making about acceptable levels of risk and the strategies used to mitigate this risk (Paton & Bishop, 1996; Syme, Bishop & Milich, 1992). Risk communication strategies based on social justice principles increase the likelihood that citizens take responsibility for their own safety, thus increasing their motivation to act to safeguard themselves. Equity may also be an issue within families. Bushfire interviewees suggested that difference in opinions within families regarding imbalances in the trade-off between preparation costs (e.g., effort

expended) and benefits (e.g., usefulness of measures) reduced motivation to prepare.

These issues must be accommodated in risk communications. Discussion with people in areas susceptible to earthquake and bushfire hazards suggest that risk communication would be rendered more effective if it engaged people in meaningful ways. A useful strategy is to elicit citizens' model of each hazard and correct identified misunderstandings. One way of implementing this strategy involves asking people to identify the activities they deem important for themselves and their family and structuring discussion around how protective actions could protect these important elements (Paton et al., 2001). It is also evident that citizens must be provided with specific information on the costs and benefits of actions, and that these must be reiterated following the introduction of new structural mitigation measures.

Critical Awareness

A second predictor of motivation is critical awareness–the extent to which people perceive hazard issues as important enough to think about them and to discuss them with others on a regular basis (Bagozzi & Dabholar, 2000; Dalton et al., 2005; Paton, 2003; Paton et al., 2005). The nature and frequency of discussion regarding disasters is linked to participation in community activities (e.g., membership of clubs or social action groups) (Bishop et al., 2000; Paton et al., 2001; Paton & Bürgelt, 2005). Critical awareness could be increased by inviting representatives of community groups (e.g., community boards, Greypower, Rotary, religious and ethnic groups) to review hazard scenarios regarding how to deal with the potential challenges, opportunities and threats they could pose for their members (Lasker, 2004; Paton, 2000). To expedite this process, it would be helpful to have knowledge of the content of these interactions.

Bushfire interviewees believed that sharing real-life stories of bushfire experiences helped distribute realistic knowledge about bushfires, their consequences, and how and why to prepare (Paton & Bürgelt, 2005). Participants in the earthquake focus groups believed that the relationship between community discussion and preparing was strengthened by the involvement of respected and knowledgeable community members. The importance of community leadership is evident from other sources (Dalton et al., 2005; Lasker, 2004), with the

credibility of community leaders deriving from their knowledge and their ability to reconcile mitigation actions with peoples' needs and concerns. Tsunami focus group participants also believed that having access to someone knowledgeable about their situation, who would provide accurate information, and who could assist them to construct family emergency and evacuation plans in ways consistent with their needs was important (Johnston et al., 2005). However, because community members differ with regard to the perceived importance of hazard issues and their discussion, it is important to understand why some people actively discuss issues while others do not. One way of exploring this is in terms of peoples' attitudes and the social norms prevailing within a community.

While people hold attitudes to most of the issues that impinge upon them, they are not given equal importance. Rather, they are organized hierarchically according to their relative importance (Bagozzi & Dabholar, 2000; Hardin, & Higgins, 1996). Thus, even if people have a positive attitude to natural hazard risk reduction, this does not guarantee its translation into protective actions. For example, more salient beliefs regarding crime or health care issues may subjugate their natural hazard counterparts as determinants of action or some highly salient attitudes may preclude supporting certain mitigation strategies. The bushfire interview data revealed that, irrespective of their general attitudes to safety, people who held strong positive environmental protection attitudes found it difficult to support mitigation measures such as controlled burning or clearing that would result in destroying the environment they value. These examples reiterate other findings suggesting that attitude ambivalence moderates acting on intentions (Conner, Povey, Sparks, James & Shepherd, 2003).

The salience of hazard issues, the likelihood of their being topics of regular discussion, and the content of discussion can be influenced by social norms. The judgments people make regarding their actions is influenced by beliefs regarding how significant others would evaluate them if they were to support or adopt a mitigation measure. If they believe others would value such actions, the likelihood of adopting a protective measure is greater, and vice versa. For example, beliefs regarding what others would think and the social disapproval or legal actions that could accompany certain actions (e.g., clearing shrubs from around a property) resulted in people deciding not to adopt bushfire mitigation measures. However, shared beliefs regarding

social responsibility and social reciprocity (e.g., to give back to the community and assist one another) were cited by others as factors supporting the adoption of protective measures. Thus, it is important to examine how people perceive problems relative to the views held by significant others.

Recent work provides empirical support for this view (McIvor & Paton, in prep). They found that attitudes and social norms regarding hazards influenced the formation of intentions to prepare for earthquakes. While attitudes had a direct effect on intention, the influence of subjective norms was mediated by peoples' beliefs in the ability of mitigation measures to actually reduce risk. This introduces a need to consider factors that could mediate the conversion of motivation into intentions to act.

Once motivated, people are then faced with a new series of issues about which judgments are required. This issue is discussed here in relation to decisions about two issues. The first concerns the relationship between the protective actions proposed and the person's beliefs about the capacity of these measures to reduce risk. The second involves peoples' beliefs about their competence to implement them. These issues are addressed in the next section.

STAGE TWO: FORMING INTENTIONS TO PREPARE

Progression to intention formation is a function of peoples' belief in the ability of mitigation measures to surmount hazard effects, and their belief in their competence to act and to resolve the demands associated with hazard effects (Paton, 2003; Paton et al., 2005). Paton et al. (2005) found that, in addition to its direct influence, critical awareness had an influence on intentions that was mediated by outcome expectancy. Similarly, Lasker (2004) concluded that, on its own, hazard salience resulted in 35 percent of respondents supporting protection planning. However, when salience and the perceived capacity of protective measures to reduce harm were combined, this increased to 89 percent. Duval and Mulilis' (1999) Person-relative-to-Event model also concluded that preparing was a function of the interaction between self-efficacy (people's assessment of their resources to enable an action) and response efficacy (perception of the efficacy of adjustment in protecting persons and property). Lindell and Whitney's

(2000) finding that response efficacy was a stronger predictor of preparedness than self-efficacy or perceptions of an earthquake's probability, severity and immediacy (i.e., risk perception) reiterates the importance of beliefs in the capability of protective action to reduce or eliminate adverse hazard consequences (Garcia, 1989; Farley, Barlow, Finkelstein, & Riley, 1993; Paton & Johnston, 2000) as a predictor of their adoption.

If the factors that influence perception of effectiveness can be understood, we will be in a better position to design effective intervention. In pursing this objective, discussion here considers how fatalism and locus of control, perceptions of the causes of loss and damage, and the media coverage of disaster influence the perceived effectiveness of mitigation measures.

Fatalism

Fatalism–the belief that the destructive effects of a hazard are inevitable–is a key predictor of people's failure to prepare for earthquakes (Turner, Nigg, & Paz, 1986). Fatalism relates to locus of control. Citizens with an internal locus, who believe that circumstances reflect their own actions, exert more control over their circumstances than those with an external orientation, who believe that circumstances reflect societal forces and chance factors such as fate (Strickland, 1989). People with an internal locus are more likely to prepare for tornadoes (Sims & Baumann, 1972), take out flood insurance (Baumann & Sims, 1978), and see earthquake damage as preventable (McClure et al., 1999; Simpson-Housley & Bradshaw, 1978).

External locus of control relates to learned helplessness in which people attribute negative events to uncontrollable causes, or generalize from genuinely uncontrollable events to other events that can be controlled, and so remain passive (Abramson, Seligman, & Teasdale, 1978; McClure, 1985). For example, many people assume that because earthquakes are uncontrollable, their devastating effects are also uncontrollable (Turner et al., 1986). However, while the events might be uncontrollable, the magnitude of the consequences can be influenced.

Consequently, preparedness could be enhanced by changing people's locus of control beliefs towards a more internal locus of control. However, this task is not straightforward, as these beliefs have firm

cultural and psychological underpinnings. Fatalism and locus of control beliefs are not simply reversed by exposure to a factual message, but they can be modified when strategies target specific domains (Turner et al., 1986), and when the contingency between mitigating actions and positive outcomes is demonstrated (e.g., Strickland, 1989).

Turner et al. (1986) showed the value of focusing on specific situations by asking citizens if they thought anything could be done to help more vulnerable groups, such as people living in unsound buildings and children in schools. When citizens focused on these specific targets, they were less fatalistic and thought that preventive action would be helpful. Similar findings were obtained by Flynn, Slovic, Mertz, and Carlisle (1999). Likewise, when citizens' attention is shifted from the awe-inspiring aspects of the earthquake to specific groups and concrete actions, their outcome expectancy increases (Charleson, 1991; Smith, 1993).

However, there are limits to how much risk messages can produce these positive effects. People with a strong external locus of control believe that damage cannot be prevented, even where damage is demonstrably exceptional (McClure et al., 1999). They cannot see that the damage often reflects something about the damaged building. In such extreme cases, it is necessary to employ other motivational strategies and legislative requirements. These principles also apply with cultures and ethnic groups that have a more fatalistic orientation (Perry et al., 1981).

Interpreting the Causes of Loss and Damage

The concept of fatalism also relates to attribution theory, a framework that examines people's explanations of different outcomes. Attributions for damage reflect the complexity of people's causal models about hazards (cf., Bostrom et al., 1992; McClure et al., 1999). While expert models might include earthquake magnitude and proximity, soil type, building design, and so on, ordinary people commonly have relatively simple models of earthquakes. They typically perceive earthquakes as catastrophic events that inevitably produce major damage, regardless of what people do (Turner et al., 1986). They are less aware of factors that mediate the effects of earthquakes, and therefore see the outcomes as less controllable.

This view was reiterated by tsunami focus group participants. Being

presented with information they found inadequate (i.e., to explain complex hazard consequences and their relationship with mitigation measures) made it more difficult both to form expectations about what happens when a tsunami strikes and to conceptualize the need for and relevance of protective measures. Being overwhelmed increased participant apathy, reducing the likelihood of their preparing. The participants believed that education that focused more on explaining how particular actions would mitigate specific consequences would motivate residents to prepare for tsunamis.

Education programs can reduce fatalism by explicitly elucidating the complex nature of natural hazards and their effects, and explaining how specific preparation measures reduce damage (e.g., earthquake damage is mediated by factors such as building construction). McClure et al. (1999) in a study of the relationship between peoples' hazard knowledge and outcome perceptions retrospectively showed that the complexity of people's models of earthquakes was positively related to their judgment that damage could be prevented. People made judgments about damage that was either distinctive (only one house in a street collapses) or widespread (all houses in a street collapse). Complexity was measured as the number of causes cited in open-ended explanations of the damage. With distinctive damage, people with simple and complex models judged the damage equally preventable. However, when damage was widespread, as predicted, people with simple models of earthquakes believed that there was little that could have been done about it, whereas people with complex models believed that damage could have been be reduced.

Hurnen and McClure (1997) examined whether citizens' knowledge of actions that mitigate earthquake damage (e.g., fastening walls to foundations with anchoring bolts) predicted their judgments of preventability. They found that participants with high earthquake knowledge were more prepared for earthquakes. Subsequently, each item in the earthquake knowledge scale was explained to participants, to clarify why each action influenced earthquake damage. Preventability judgments obtained before and after this procedure showed that participants judged the damage to be more preventable. McClure et al. (1999) and McClure et al. (2001) found that communication that emphasized the distinctiveness of earthquake damage more effective than that portraying widespread damage. In fact, warnings that portray severe, widespread damage in earthquakes will increase fatalism.

One source of information consistently implicated in conveying information in this way is the media.

Media Influences on Outcome Expectancy

Other critical attributions that influence preparing are the effect of different causal agents (consensus information) on other occasions (consistency information). With regards to these attributions, media coverage plays a crucial role. Most media reports of earthquakes ignore how different types of buildings perform, and provide little consensus and consistency information (Gaddy & Tanjong, 1987). McClure et al. (2001) presented scenarios that described a building that was damaged in a recent earthquake and stated how similar buildings had performed in other earthquakes. When the participants were subsequently presented with pictures of similar buildings that were badly damaged in other earthquakes, they attributed damage to the building's design. In contrast, when they were shown pictures with similar buildings that stood up well in other earthquakes, they attributed damage more to the earthquake. The finding that judgments about earthquake damage are affected by knowing how the same type of building behaves in other earthquakes might seem obvious to engineers and other experts. However, the uninformed fatalistic attitude of nonexperts tends to ignore these distinctions and many people assume that big earthquakes produce widespread devastation regardless of the design of structures. Unfortunately, media reporting tends to reinforce this impression.

Media coverage that emphasizes devastation reinforces peoples' belief that disasters are too catastrophic for personal action to be effective (Keinan, Sadeh & Rosen, 2003; Lopes, 1992), reducing outcome expectancy. When disaster occurs, news media usually portray scenes where the greatest damage has occurred (Gaddy & Tanjong, 1987; Hilton, Mathes, & Trabasso, 1992; Hiroi, Mikami, & Miyata, 1985), accentuating the magnitude and severity of damage. This point is illustrated by comments from a journalist arriving in Kobe after the major 1995 earthquake. "I was amazed how much of Kobe was still there. . . . I mean, I had watched hours and hours of TV in America about this earthquake, and I had no idea that there were houses and tall buildings still standing all over the city" (*International Herald Tribune,* February 2, 1995, p. 2).

Media could play a more positive role by reporting the differing performance of different types of buildings, and providing consensus and consistency information. Cowan et al. (2002) compared news reports written immediately after the 1995 Kobe earthquake with articles written a year later ("anniversary" articles). Reports written immediately after the earthquake emphasized widespread damage using headings such as: "Earthquake ravages Kobe." Those written a year later, however, focused on contrasts between the design of damaged and undamaged buildings and the lessons that could be learned from the earthquake, using headings like: "Lessons from Kobe." When these two types of reports were presented to two groups of participants (with all references to Kobe removed), the "anniversary" reports produced more controllable attributions for the earthquake damage than the "day after" reports. The more analytical articles lead to more adaptive views of earthquakes than the "catastrophe" reports written immediately after an earthquake. Consequently, the "generalized damage" information conveyed by news media can increase fatalism and lead people to attribute earthquake damage to uncontrollable causes. However, fatalism can be reduced if news media show that damage is distinctive, and if they portray scenes where buildings stand firm because of their good construction. Reports like the "anniversary" articles could be included in educational programs.

The above discussion suggests that outcome expectancy beliefs can be enhanced by presenting scenarios that increase the complexity of peoples' hazard models, demonstrating that hazard intensity and the damage they create are unevenly distributed and, with regard to damage, that loss is a function of the interaction between choices people can make (e.g., securing houses to their foundation, securing chimneys, water heaters and tall furniture) and hazard activity (e.g., shaking intensity). Demonstrating the reality of avoidable losses and how people can exercise control over these interactions increases outcome expectancy. Engendering a belief in the effectiveness of mitigation measures is important but not sufficient to ensure the formation of intentions to adopt protective measures.

Personal Competencies

If people confer upon the proposed protective measures a capacity to reduce risk, whether they progress to forming intentions is a func-

tion of their beliefs in their competence to adopt and/or implement them. Factors implicated in informing this role include coping style and self-efficacy judgments (Duval & Mullilis, 1999; Paton et al., 2005). An important aspect of coping style is peoples' capacity for problem solving and their ability to actively confront challenges. Self-efficacy has other implications for protective actions designed to mitigate the consequences of infrequently occurring hazards. The number and quality of action plans, and the effort and perseverance invested in risk reduction behaviors, is strongly dependent on one's self-efficacy judgments (Bennett & Murphy, 1997). Personal competencies that increase the likelihood of sustained action are especially important given the infrequency of the hazards people are being encouraged to prepare for.

If people are motivated to prepare, have high outcome expectancy, and are predisposed to confront problems, they are more likely to form intentions to prepare. However, the relationship between intentions to prepare and actual preparing can be moderated by several factors. These factors are considered in the next section.

STAGE THREE: CONVERTING INTENTION TO PREPAREDNESS

The formation of intention to adopt protective measures does not guarantee their conversion into action. This issue is discussed here by drawing on research on two factors that have been implicated in the process of converting intentions into preparedness; the time frame within which people estimate that the next hazard event will occur, and their level of trust in the sources of information.

Time Until Next Hazard Event

The likelihood of preparing is higher amongst those who believed that the next damaging hazard impact will occur within 12 months, and drops rapidly in those who anticipated it not occurring for several years (Paton et al., 2005). The importance of understanding this difference derives from the finding that very few people believe that a damaging hazard will occur within 12 months. For example, Paton et al (2005) found that only 6 percent of respondents believed that a damaging earthquake could occur within the next 12 months, and

Gregg et al. (2004) found that only 5 percent of residents in an area at high risk for lava flows believed it could occur within the next year. This perception could be counteracted by complementing the 'not if but when' message in risk communication with one advocating a "sooner rather than later" message.

Beliefs regarding timing could be influenced by how risk information is presented. The earthquake focus group had trouble interpreting what was meant by a 10-year or 50-year event, with this data typically being interpreted as a literal indication of when the next event will occur rather than as a statement of probability describing likelihood of occurrence on an annual basis. This would reinforce the presence of the beliefs reported in the previous paragraph regarding the need for action. If it is believed that events will not occur until some point in the more distant future, conversion of intention to action may be muted.

Trust

The adoption of protective measures is more likely when people trust the information source. The importance of trust in sources of information was endorsed by the tsunami and earthquake focus groups. The tsunami focus group described the source of their diminishing trust as stemming from the belief that civic and real estate agencies withheld information from residents because they placed concern for the impact on economic and business activity above residents' safety. Participants also believed that councils withheld information about tsunami hazards to minimize the possibility of their being criticized for what they have done, or not done, to manage the attendant risk. Trust can also be affected by citizens' beliefs that expenditure on hazard mitigation by civic agencies is unnecessary (Paton et al., 2001). Levels of trust can be affected by beliefs that the information provided is incomplete or inconsistent with views developed from peoples' independent search for information (e.g., using the internet, talking with other residents). These examples illustrate the perils of failing to engage community members in discussion about hazards and what to do about them.

Equity and fairness regarding the distribution of risk throughout different sectors of the community and members' involvement in decision making about acceptable levels of risk and risk reduction under-

pin community members' trust in civic sources (Lasker, 2004; Paton & Bishop, 1996). Syme et al. (1992) demonstrated that engaging community members about hazards with potentially devastating consequences significantly influenced their commitment to take responsibility for their own safety and to trust the source of information. By involving community members in decision making about risk and risk management, citizens were less inclined to want to "scapegoat" those responsible for emergency planning. This appeared to be due to greater community knowledge of the trade-offs involved in creating safer environments. Thus, levels of trust, satisfaction with communication, risk acceptance, and collective commitment to confront hazard consequences are increased by community engagement based on procedural justice principles.

CONCLUSION

The adoption of protective measures involves a complex reasoning process within which people make a series of decisions as they negotiate the relationship between them, environmental hazards, and the resources and actions required to protect themselves. Under these circumstances, facilitating preparing requires more than just making information available to people. It is crucial to provide information that meets the needs of people, that makes sense to people, and that assists their decision making in a context described by the interaction between information from scientific and civic sources and the psychological, social, cultural characteristics that frame peoples' needs, expectations, and beliefs. These relationships must be understood and accommodated in strategies designed to encourage the adoption of protective measures.

Given the sequential nature of the preparedness process, the effectiveness of intervention will be enhanced by using it as a guide to assist people to address issues about which decisions must be made (e.g., to discuss issues with others in their community, to accept risk, believe in the efficacy of mitigation measures, etc.) as they negotiate their relationship with a hazardous environment. It is also important that these strategies actively engage community members in ways that assist their making each decision. This would entail matching the decision support offered to the specific decisions required in each phase. For

example, intervention to change outcome expectancy could involve presenting information that counters fatalism by illustrating how specific actions can mitigate risk from certain hazard effects. A different approach would be required to encourage more discussion within a community. Similarly, promoting change in core competencies such as self-efficacy and action coping will involve citizens in identifying and resolving problems in their community.

This is an area in which several interesting issues remain to be explored. This chapter focused on the adoption of protective actions. Future work must examine the possibility that "not preparing" represents the outcome of a discrete reasoning process (Paton et al., 2005) whose influence may have to be counteracted prior to attempting to encourage the adoption of protective measures. Additional work is also required to determine whether similar processes influence tasks with different protective functions. For example, do similar mechanisms underpin decisions to adopt protective (e.g., securing furniture and fittings, securing roofs to houses and houses to foundations, installing waterproof cladding) and self-reliance (e.g., storing food and water, preparing household emergency plans) measures? The possibility of their being influenced by different factors is supported by observations that the former tend to be less frequently endorsed by respondents than the latter. Given that protective measures will influence whether people survive the impact (e.g., if the house and its furniture is inadequately secured occupants may be killed or injured) they may not be in a position to capitalize on their self-reliance resources, this issue should be given a prominent place in future research agenda on preparedness. It is also important to audit preparedness to ensure that the data available is representative of actual preparedness behavior.

The effort expended on this task is important. The foundation of adaptive capacity is having the resources available to facilitate coping with the temporary disruption associated with the immediate impact of hazard activity and the beliefs and psychological competencies necessary to use them to confront the consequences of hazard activity. The adoption of protective measures and the competencies to use them are complimentary (Paton et al., 2001). While the social and psychological factors and competencies described in this chapter do increase the likelihood that people adopt essential protective measures, they also fulfill another function. They have a key role in pre-

dicting people's ability to actively and constructively confront and cope with adverse experiences and disruption to their lives posed by hazard activity. This role makes these factors important components of adaptive capacity.

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