

# **Community Resilience: Integrating Hazard Management and Community Engagement**

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## **Abstract**

Many communities are susceptible to natural hazard consequences. While the consequences themselves cannot be prevented, their implications for community sustainability are influenced by the preparedness of the community and its capacity to mitigate and/or adapt to disruptive consequences (its resilience). The shift in emergency management from a response-based to a risk management focus has stimulated interest in the identification of factors that predict a capacity for adaptation under these circumstances.

Drawing upon a study of the response to salinity in Victoria, studies of adaptation to volcanic hazard consequences in New Zealand and in Hawaii, and studies of earthquake mitigation this paper will discuss how individual (e.g. self-efficacy, sense of community), community (e.g. community competence, social justice) and societal/environmental (e.g. community empowerment, access to natural environment) can be intergrade to constitute a model of adaptive capacity based on community engagement. The implications of these findings for risk communication, hazard mitigation, community development and community sustainability will also be discussed.

## **Keywords**

Disaster, resilience, vulnerability, community, readiness

## **Introduction**

A long history of societal development in places exposed to natural processes such as bushfires, severe storms, flooding, tsunamis and seismic hazards has meant that potential exposure to natural disasters is a fact of life for many communities. Objectively, societal risk from natural hazards is constantly increasing. Even if the probability and intensity of hazard activity remain constant, continuing population growth and economic and infrastructure development results in a concomitant increase in the potential magnitude and significance of loss and disruption associated with hazard activity, and consequently, risk. Increasing community diversity makes a similar contribution to risk.

Because much economic, infrastructure and social development has already taken place in areas in which risk has been recognised, a core objective of contemporary emergency management is the use of risk management principles to guide planning to develop community capacity to co-exist with natural processes whose activity can sometimes constitute highly disruptive hazards. This approach has also been fuelled by a progressive shift from a focus on defining disaster impact solely within a deficit or loss paradigm, to one that accommodates the capacity of individuals and communities to

adapt, and possibly grow or develop, in the face of adverse or challenging circumstances (Antonovsky 1993; Eng and Parker 1994; Greene 2002; Lindell and Whitney 2000; Norman 2000; Paton 2000; Paton and Bishop 1996; Paton et al. 2003; Tobin 1999).

Contemporary use of the risk concept, which typically portrays risk and loss as synonymous, does not represent a paradigm capable of encapsulating these new perspectives. The emphasis on deficit or loss outcomes is, however, of relatively recent origin, and a return to using the risk concept in the manner in which it was originally intended can remedy this problem. According to Dake (1992), the concept of risk originally described the probability of an event occurring combined with an accounting for the *gains and the losses* that the event could represent if it occurred. Interestingly, similar views are espoused in Chinese symbolism, which defines a crisis as a combination of two realities: a danger and an opportunity. Conceptualising the consequences of hazard exposure as comprising gains and losses represents a more appropriate framework within which to capture the essence of a contemporary emergency management that seeks to promote sustainable practices, resilience and growth as well as mitigating losses. Before pursuing this issue, it is pertinent to reflect on whether gains and losses do indeed occur.

While evidence of loss associated with disaster is extensive, the existence of beneficial consequences has often been overlooked by research that has focussed primarily on the immediate aftermath of adverse events. However, when the time frame within which analyses are conducted is extended, evidence for adaptive and growth outcomes has become increasingly apparent.

Taylor, Wood, and Lichtman's (1983) research on survivors of natural disasters concluded that not only did the majority of those so exposed overcome the victimising aspects of the experience, many actually benefited from it. Joseph et al. (1993) observed that while many survivors of a passenger ferry disaster remained traumatised three years after the event, most (90 per cent) survivors reported strong positive changes in their outlook on life, feeling more experienced about life, and over half rated their life as changed for the better. Similar changes at the community level have also been reported (Sarason 1974; Bolin and Stanford 1998). A growing body of empirical evidence also attests to the fact that these dimensions should be regarded as discrete outcomes capable of existing concurrently (Aldwin et al. 1994; Linley and Joseph 2004; Solomon et al. 1999). Evidence thus exists to support the application of the risk concept in its original formulation.

In addition to supporting the co-existence of gains and losses as a reality of disaster experience, this work also suggests that growth and deficit outcomes are predicted by different sets of variables (Linley and Joseph 2004; Paton 2006). This view can be supported on theoretical grounds. For example, self-efficacy has been implicated as a predictor of adaptive capacity and adversarial growth (Linley and Joseph 2004; Paton and Bishop 1996; Paton et al. 2000). That is, a high level of self-efficacy is associated with high adaptive capacity or growth. However, low self-efficacy does not increase the incidence of deficit outcomes; it just reduces the level of adaptation that can be

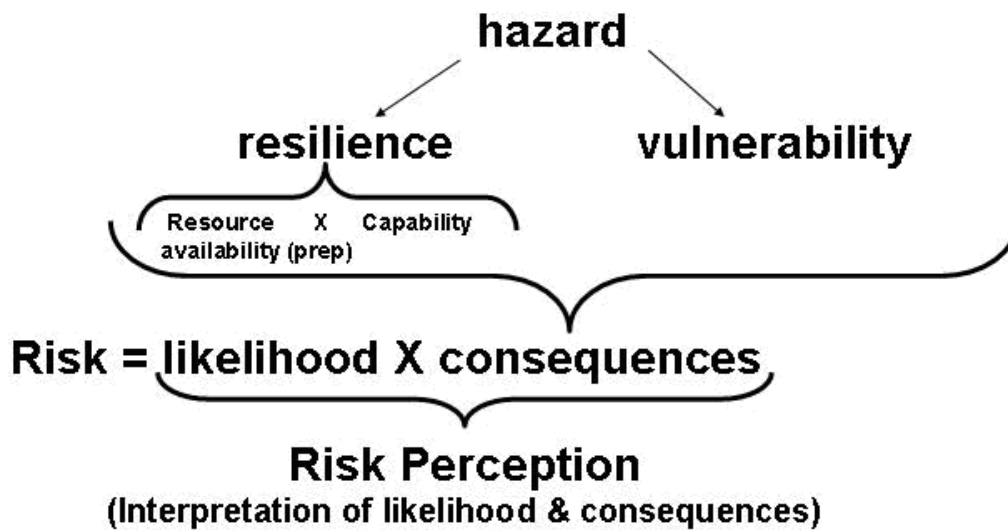
expected. A similar argument can be proposed for learned helplessness (with high levels predicting deficit outcomes and lower levels predicting relatively lower risk of such deficits) and for positive and negative affect. In the subsequent discussion, those factors that contribute to susceptibility to loss will be defined as vulnerability factors, and those predicting adaptation and possibly growth, as resilience factors. This work suggests that not only should risk management consider deficit and adaptive/growth outcomes, it should also view each as resulting from the operation of discrete sets of predictors that must be managed accordingly.

A return to the original conceptualisation of risk has additional implications for risk management. The basic model of risk as a product of the likelihood of a hazard event occurring and its consequences (Hood and Jones 1996) does not change. With the regard to the former, while it is impossible to influence probability of hazard activity per se, likelihood data can inform strategies such as land use planning that prevent development in specific areas. Resurrecting the original model of risk does, however, have significant implications for managing consequences. It is now pertinent to subdivide their management in ways that reflect the differential influence of resilience and vulnerability factors on growth and deficit outcomes respectively.

### **Social perspectives on hazard mitigation planning**

Strategies to manage risk through altering or influencing hazard consequences can be broadly subdivided into two categories. The first is directed towards managing the risk to the physical and built environment (e.g. retrofitting buildings and structures, lifelines engineering, land use planning). The second arises from recognition that hazards have an impact on people that is independent of their effect on the natural and built environment and is directed towards facilitating individual and collective changes in behaviour (e.g. encouraging support and/or adoption of protective measures) and increasing their capacity to adapt to adverse circumstances. In contrast to the former, in which relatively objective analyses of known data regarding the likelihood of hazard occurrence and its consequences informs the process, the latter occurs in a context defined by considerable social, political, economic and psychological diversity. This defines the context within which this paper explores the potential to describe risk management and community development as complementary.

Mitigating risk through social and behavioural routes must accommodate the fact that people interpret the information presented with regard to their expectations, experience, beliefs and misconceptions (Dow and Cutter 2000; Lasker 2004; Paton 2003) and these, in turn, influence their decision-making and behaviour. That is, people's 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 to influence outcome. If they are to be effective, these factors must be understood and accommodated in risk communication strategies. Furthermore, with respect to their relationship with hazards, these processes cannot be regarded as neutral. Some will contribute to a capacity to adapt, but others may amplify the detrimental consequences associated with hazard activity.



**Figure 1. The relationship between risk, resilience and vulnerability**

From a social perspective, this means that hazard consequences cannot be understood in terms of the direct effects of the actions of the hazard per se. Rather they reflect the interaction between hazard characteristics and those individual and community elements that increase susceptibility to experiencing loss from exposure to a hazard (i.e. increase vulnerability) and those that facilitate a capacity to adapt or adjust (i.e. increase resilience) (Figure 1). In this context, risk management can be described in terms of the choices made regarding the reduction of vulnerability and the development of resilience or adaptive capacity. While this paper focuses primarily on resilience, a comprehensive understanding of risk requires recognition of the complementary role played by vulnerability. In this context, discussion commences with a brief introduction to vulnerability.

### **Vulnerability**

Several individual factors have been identified as predictors of vulnerability. These include personality (e.g. neuroticism) and dispositional factors such as denial-based coping, learned helplessness and developmental immaturity (Violanti and Paton in press). Vulnerable groups can also be defined with respect to demographic (e.g. age, ethnic minority status, educational level) and environmental (e.g. economic resource limitations, marginalised political and economic status, family dynamics, limited social network access) characteristics (Bolin and Stanford 1998; Bravo et al. 1990; Fothergill, Darlington and Maestos 1999; Kaniasty and Norris 1995; Lindell and Whitney 2000; Morrow 1999; Omer and Alon 1994; Schwarzer et al. 1994; Violanti and Paton in press).

The well-documented potential of these factors to increase vulnerability means that they have a key role to play in estimating risk, and their continued inclusion within social policy agenda is essential. However, the relatively immutable nature of several of these variables (e.g. personality, ethnicity) precludes their use in active risk management strategies. That is, these factors make a relatively fixed

contribution to increasing susceptibility to loss. However, vulnerability factors may co-exist with factors that facilitate a capacity to adapt to adverse circumstances (Cadell et al. 2003; Kaniasty and Norris 1999; Kato et al. 1996; Linley and Joseph 2004; Paton 2000; Paton et al. 2001; Tobin and Whiteford 2002). These complementary factors do not reduce vulnerability per se. Rather, they co-exist with, and have an action that is independent of, vulnerability. This reiterates the earlier argument for vulnerability and resilience to be viewed as discrete processes that do not, as often assumed, lie at opposite ends of a continuum. For example, in groups characterised by ethnic minority status, age and poor educational status, the complementary presence of high levels of community participation and empowerment has been found to result in better outcomes than would have been anticipated on the basis of the presence of characteristics normally associated with loss or deficit outcomes (Buckle 2001; Cadell et al. 2003; Handmer 2003; Paton et al. 2001; Saegert 1989; Schwarzer et al. 1994). Thus, some community members possess or have access to psychological, social and cultural resources that provide a complementary capacity for adaptation that is absent in those who do not share these characteristics.

Evidence of a relationship between exposure to adversity and personal, community and professional growth (Paton 2000; Schwarzer et al. 1994; Tobin and Whiteford 2002), should not be used to infer the elimination of community loss and disruption from disaster (Kaniasty and Norris 1999; Tedeschi and Calhoun 2003) and a need for strategies to manage the latter remains. According to this view, at any point in time, there exist factors that increase susceptibility to loss, but these co-exist with factors that influence capacity to adapt. It is the relative balance of these factors that are available or mobilised when confronting hazard effects that determine risk. It also points to the need to manage these resilience and vulnerability processes rather than risk per se.

If these characteristics can be identified, and if they are amenable to change, it will be possible to manage the prevailing levels of these characteristics or resources, and so to manage risk. While not pursued in depth in this paper, it is also important to identify and change the more mutable characteristics (i.e. manage vulnerability) that increase susceptibility to experiencing deficit outcomes. Candidates for the latter include, for example, denial coping, learned helplessness and community fragmentation. The management of these vulnerability factors will not, however, contribute to the development of adaptive capacity directly. Consequently, it is important to include strategies designed specifically to enhance adaptive capacity in risk management.

Recognition of the fact that the choices that can be made are less about hazards per se and more about how communities and their members experience them in the context of their social psychological, cultural and institutional characteristics means that the process of making these choices should no longer be viewed as the preserve of emergency managers. It should be regarded as an intrinsically community-based process. In order to manage risk by altering consequences, it is essential to identify what it might be possible to make choices about. That is, identifying the

constituent components of a resilient capacity and articulating the mechanism by which they act. It is to a discussion of candidates for these adaptive resources and processes that this paper now turns.

### **Resilience**

Given that hazards impact all levels of society, resilience, or adaptive capacity, must be conceptualised as comprising several, interdependent, levels. For example, the ability of a community to 'bounce back' and recover using its own resources requires that attention be directed to safeguarding the physical integrity of the built environment and lifelines (e.g. land use planning, building codes, retrofitting buildings), ensuring economic, business and administrative continuity (including emergency management and social institutions), and promoting heritage and environmental sustainability (Paton and Bishop 1996; Paton and Johnston, in press; Tobin 1999).

A common denominator in conceptualisations of the adaptive response to adversity is an emphasis on the ability of communities to draw upon internal personal and social resources and competencies to manage the demands, challenges and changes encountered (Paton and Bishop 1996; Paton 2000; Rauh 1989). According to this definition, a capacity to adapt can be summarised as comprising two elements. One concerns the existence of the resources required to facilitate coping with the disruption and loss associated with hazard activity. This makes preparation, the process by which resource availability is encouraged, an important component of resilience (Lasker 2004; Paton 2003). The second component concerns the systems and competencies required by people and communities to coordinate and utilise these resources to confront challenging circumstances and to adapt or adjust to the consequences of hazard activity (Paton et al. 2001).

To develop a comprehensive understanding of this adaptive capacity it is pertinent to distinguish between the impact, response and recovery phases of the disaster experience, and to consider their implications for the nature of the adaptive response over time. During the immediate impact phase (the first three or so days), people will be isolated from all external assistance and will have limited, if any, access to normal community and societal resources and functions. Under these circumstances, the effectiveness of their adaptation and coping efforts will be a function of prevailing levels of individual/household preparedness (e.g. knowledge of hazard impacts and how to deal with them, the resources they have available to assist this) and their capacity for self-reliance (Lasker 2004; Paton 2003). Given that disasters can strike with no or very little warning, unless organised in advance there will be no opportunity to build the requisite knowledge or resources when disaster strikes. Understanding preparedness thus has a central role to play in understanding adaptive capacity.

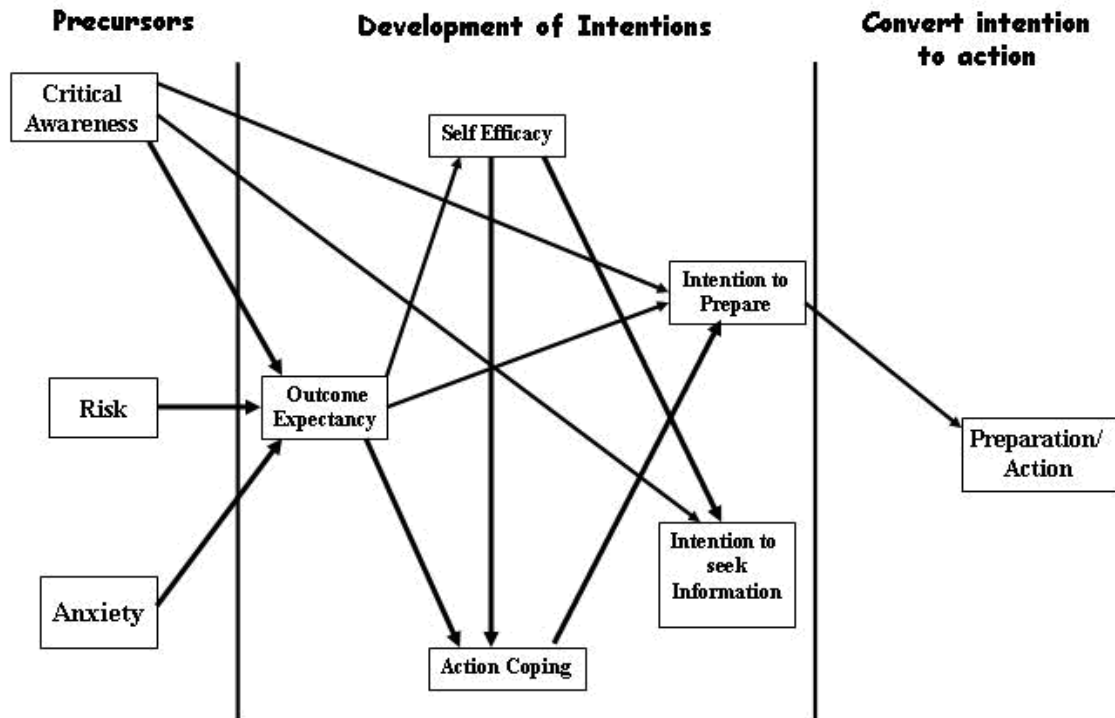
As the disaster progresses, demands change and the context of response shifts. As the impact phase subsides, people will be presented with more opportunities to work with neighbours and other community members to confront local demands. At this stage, adaptive capacity will reflect the capacity of community members to work with others to plan and execute tasks. The existence of such mechanisms will also enhance collaboration with formal (e.g. emergency services, relief) agencies,

particularly in regard to the effective mobilisation and use of volunteers from within the community. As the event progressively moves through the response phase, formal intervention will increasingly make its presence felt. Adaptive capacity will now be a function of the quality of interaction between people and between communities and societal-level institutions (Lasker 2004; Paton and Bishop 1996). Similar processes will be required to facilitate effective resolution of issues during recovery and rebuilding. A capacity for the progressive unfolding of this more comprehensive capacity, involving the integration of individual, community and societal levels, must be developed in advance. Given that it is argued here that this capacity is built on a foundation of preparedness, discussion commences with a review of how this can be facilitated.

### **Resilience and household preparedness**

The adoption of hazard preparedness measures reduces the risk of damage and injury (e.g. securing fixtures and furniture) and facilitates a capability for coping with the temporary disruption associated with hazard activity (e.g. storing food and water, preparing a household emergency plan). Preparation thus represents a significant predictor of the capacity to adapt to unforeseen circumstances. A positive relationship between preparedness and mental health (Benight et al. 1999; Hobfall 1989; Sattler et al. 2002) adds an additional dimension to the process and increases its importance as an activity that should enjoy a prominent position in mitigation planning. It could be used, for example, to anticipate the potential distribution of acute stress reactions, and to assist planning for community mental health service delivery within the post-disaster environment.

Research has consistently found that levels of preparedness remain low, even in areas where risk is high (Ballantyne et al. 2000; Gregg et al. 2004; Lindell and Whitney 2000; Paton et al. 2000). A prominent reason for this has been the assumption that providing the public with information on hazards and the protective measures required to mitigate their consequences will automatically translate into preparedness. This assumption is unfounded (Lasker 2004; Lindell and Whitney 2000; Paton 2003). There are several reasons for this. Risk communication based on the dissemination of general information (e.g. pamphlets, media advertisements) represents a passive form of communication that fails to address the diversity of needs and expectations within a community (Ballantyne et al. 2000). As we shall see, preparation is the outcome of a series of decisions that occur in the context of people's perceptions of their relationship with a hazardous environment. Because a capacity to make these decisions can only be developed from active involvement of community members, risk communication based on information provision alone will fail to engage people in ways that facilitate their ability to make these decisions. Finally, while this medium involves the passive presentation on information, people themselves are actively involved in interpreting it. This reflects the operation of both cognitive biases and social processes. Discussion of the implications of these factors for risk communication will now be discussed in the context of a model of natural hazard preparedness.



**Figure 2. The preparedness process. Adapted from Paton et al. (2005).**

Drawing upon work on health protective behaviour and the community psychology literature on community change, Paton (2003) proposed a multi-stage model of natural hazard preparedness. Subsequent empirical tests of the predictive capability of the model for earthquake preparedness validated this approach (Paton et al. 2005). This model is depicted in Figure 2. It describes preparation as a reasoning process that comprises a sequential series of decisions that people make regarding their relationship with a hazardous environment. That intention played a prominent mediating role in the model proved to be a highly significant element of the model. Structural equation analysis revealed that intentions could be differentiated in regard to their relationship with preparing (Paton et al. 2005). Only 'intention to prepare' mediated this relationship (Figure 2). 'Intention to seek information' did not lead to action. This distinction has been reiterated in similar analyses of bushfire, volcanic and tsunami preparedness (Paton et al. forthcoming). It implies that the reasoning process that leads to 'preparing' is separate from that leading to 'not preparing'. 'Preparing' and 'Not Preparing' do not lie at opposite ends of a continuum. Thus, while one set of strategies will be required to change reasoning processes that support decisions not to prepare, a separate set of strategies will be required to encourage preparedness (Paton et al. 2005).

### **The preparation process**

The model describes the adoption of protective actions as a three stage process that is triggered by motivation to prepare. Motivation is influenced by several factors. One predictor is the level of perceived threat or risk posed by a hazard. However, people's interpretation of risk in this context need not share the relative objectivity that characterises expert analysis. Rather, it may be influenced

by interpretive processes that reflect the operation of cognitive biases and the social context within which people live.

Relative to objective estimates, people's estimates of their perceived risk can differ because they overestimate their existing knowledge (Ballantyne et al. 2000). It is also affected by people basing their estimates of their risk on the relationship between hazards activity and personally salient issues (Bishop et al. 2000; Paton et al. 2001). These authors 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 degree to which people's livelihood was affected. The diversity of employment activities undertaken within a given area means that the best way to translate this into effective risk communication is through the direct engagement of people in discussions that focus on the personal consequences that hazard activity might have for them.

Risk perception is also influenced by people comparing themselves to others. 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 (Paton et al. 2000). That is, they transfer risk to others within their community. If all members are interpreting their relationship with the hazard in the same way, the need for action is attributed to others, with motivation to prepare being diminished by this inappropriate assumption.

An additional bias is a tendency to overestimate the capacity of hazard mitigation strategies to eliminate a threat that reflects the operation of an interpretive bias known as risk compensation (Adams 1995). 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. hazard monitoring, structural mitigation) will decrease perceived risk (by an individual or group), reducing motivation to start the preparedness process. For example, the dissemination of information on structural mitigation to the public has been found to lead to a reduction in levels of household and personal preparedness and a transfer of responsibility for safety to civic authorities (Paton et al. 2000).

Overestimating existing knowledge, overestimating the effectiveness of mitigation measures, or transferring responsibility or attributing the need for preparedness to others will result in people underestimating risk relative to more objective estimates. Countering these problems involves personalising hazard information and disseminating it in ways that involve engaging people in debate. That is, encouraging people to interact with and to interpret information relative to its implications for themselves and their family, and for activities they deem important (Paton and Johnston in press).

A second prominent motivator is the extent to which people perceive hazard issues as important enough (critical awareness) to think about and discuss with others on a regular basis (Paton 2003; Paton et al. 2005). A key question here is: What determines the salience or otherwise of an issue? While this relationship could reflect several personal factors, it is possible to identify generic predictors by focussing on how this relationship is influenced by attitudes and social norms.

People hold attitudes to most of the issues likely to impinge upon them, but these attitudes are not given equal importance. Rather, they are organised hierarchically according to their relative importance (Bagozzi and Dabholar 2000; Hardin and Higgins 1996). While people may have a positive attitude to natural hazard risk reduction, this does not guarantee that it will translate into support for readiness actions. For example, relatively stronger beliefs regarding the importance of crime or health care may subjugate natural hazard risk attitudes to positions of lesser importance or salience as determinants of action.

Salience could also be influenced by social norms. The judgements people make regarding acting on attitudes 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 a positive risk reduction attitude leading to support for mitigation would be greater. Thus, it is important to examine how people perceive problems relative to the views expressed by significant others. Recent work on bushfire preparedness has provided support for this view (Paton and Kelly forthcoming).

Anxiety related to earthquakes was found to inhibit motivation to prepare (Paton et al. 2005). Furthermore, it reduces the likelihood that people will even attend to risk messages. The presentation of general information is unlikely to be effective under this condition. Managing this requires an alternative approach, and one that may include a clinical component directed to the management of anxiety.

If hazard issues are salient, if people believe the hazard can adversely affect them, and if their levels of associated anxiety or worry are low, people will progress to the intention formation stage. However, the relationship between motivations and intentions is mediated by another set of factors. Even if motivated, people will not formulate intentions to act if they perceive hazard effects as fundamentally insurmountable (low outcome expectancy), do not perceive themselves as having the competence to act (low self efficacy), or are not disposed to confront problems (low action coping) (Paton 2003; Paton et al. 2005). With regard to natural hazards, outcome expectancy comprises beliefs regarding the feasibility of mitigating hazard consequences through personal action. This sense of fatalism is sustained by media coverage that emphasises devastation. The use of distressing images in risk communication messages can reinforce people's belief that disasters are too catastrophic for personal action to be effective (Keinan, Sadeh and Rosen 2003; Lopes 1992; Paton and Johnston in

press), reducing their outcome expectancy. This reflects people perceiving loss as being caused by uncontrollable, catastrophic natural forces. It is, however, possible to change these.

Changing these perceptions involves, for example, presenting scenarios that demonstrate 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 they 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 describing how people can exercise control over these interactions increases outcome expectancy (Paton and Johnston in press). Outcome expectancy is also greater if people see an immediate benefit from protective actions. If people are motivated to prepare, have high positive outcome expectancy, and have personal characteristics that predispose them to act (e.g. self-efficacy, action coping; Paton et al. 2005), they are more likely to form intentions to prepare, and to progress to adopting protective measures.

Finally, the formation of 'intentions to prepare' should not be taken to automatically imply their conversion to action. Prominent moderators are the time frame within which people estimate or assume that the next hazard event will occur (adoption is more likely if people believe it will occur within the next 12 months), and their level of trust in the sources of information (Lasker 2004; Paton et al. 2005).

These studies suggest that preparedness is a process that must be managed through the active engagement of community members within the risk communication process. Preparedness involves a reasoning process within which people make a series of decisions regarding the relationship between them, the hazard and the protective actions available. In this context, facilitating preparedness is less about giving people information per se, and more about interacting with community members in ways that address their needs and assist them to make preparedness decisions.

The variables that comprise the model define the sequence of judgements required to decide whether or not to prepare. Differences in the nature of the variables involved at each stage in the process means that a range of strategies are required to secure change in the direction of greater preparedness. Providing people with information may increase general awareness, but it is unlikely to produce change in perceived threat, anxiety or critical awareness. For example, changing people's perception of threat involves accommodating the diverse ways in which people define their relationship with a hazardous environment in the first place. Given that the latter can differ substantially from those derived from expert risk assessment, identifying the content of risk communication first requires active consultation with community members and identify issues of household and community importance (e.g. livelihood, employment, business continuity). Changing threat perception requires actively involving people in activities and discussions that facilitate their understanding and acceptance of their personal relationship with hazards. This includes correcting misconceptions and encouraging debate in ways that accommodates diversity in needs, beliefs and

goals. Similarly, promoting change in factors (outcome expectancy, self-efficacy and action coping) that mediate the process of intention formation require people to be involved in successful problem solving activities that encompass the relationship between people, hazards and outcomes required to mitigate hazard effects.

Encouraging preparation is thus concerned with assisting people to make decisions about the adoption of protective measures and matching the decision support offered to the specific decisions (e.g. risk, importance for community, outcome expectancy) required. Acting on these recommendations will increase capacity to adapt at individual/household levels. This level of preparation, as outlined earlier, is only one component of a comprehensive resilience strategy.

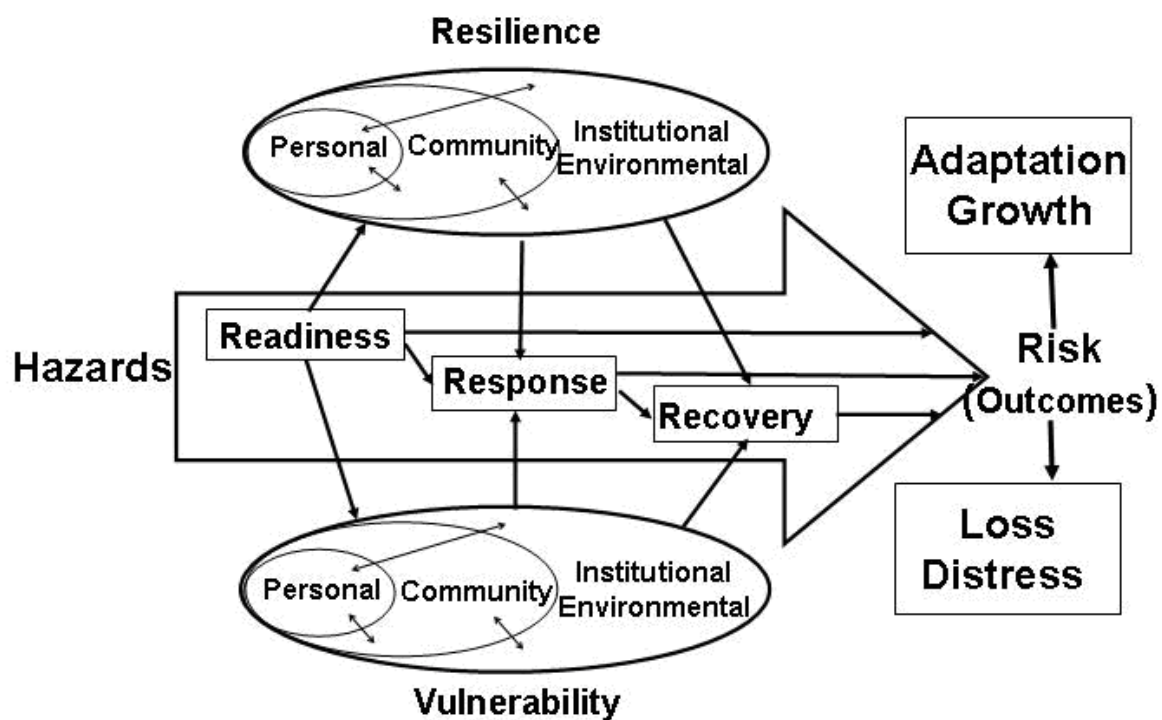
Natural disaster may not occur when people are home and preclude any opportunity to return home. Under these circumstances, the adaptive capacity of a community will be a function of preparedness in the wide range of buildings (e.g. work places, shopping malls, schools) in which people could find themselves when disaster strikes, with the level of community participation in developing and sustaining this capacity being of paramount importance within mitigation planning (Lasker 2004). Pursuing this objective requires collective planning and action. The nature of the adaptive process also changes as the event moves from the impact phase and into the response and, subsequently, the recovery and rebuilding phases.

Progression from the impact to the response phase provides greater necessity and opportunity for people to work with neighbours and other community members to confront local demands. Consequently, adaptive capacity will be defined in terms of the capacity of community members to work with others to plan and execute tasks. While collaboration can result from the shared experience of adversity per se (Sarason 1974) the existence of mechanisms to mobilise community members to deal with challenges and threats will enhance this capacity. The development of this collective competence will also enhance the quality of collaboration with civic agencies responsible for response and rebuilding efforts. The quality of the adaptive capacity of the latter mechanisms will be a function of the quality of the reciprocal interaction between people and formal societal-level resources (Lasker 2004; Paton and Bishop 1996). It is to a discussion of these resources and mechanisms that this paper now turns.

### **Modelling disaster resilience and vulnerability**

Disasters impact on people, they affect communities, and they disrupt the community and societal mechanism that serve to organise and sustain community capacities and functions. Understanding how interdependencies between people, their communities, and societal institutions and organisations influence adaptation thus becomes important. In this section, a preliminary model, developed by drawing upon existing empirical work, is proposed.

Earlier, the potential for vulnerability factors to make a separate contribution to loss or deficit outcomes following exposure to hazards was introduced. With regard to vulnerability, content could include, for example, denial or avoidance coping and community fragmentation. Linking mechanisms would include, for example, learned helplessness, a lack of formal consultative processes, and autocratic institutional practices. Reiterating the earlier discussion of their representing discrete processes, the model (Figure 3) includes a corresponding set of resilience characteristics and processes, rather than portraying resilience and vulnerability as lying at opposite ends of a continuum. The mechanisms that lead to each outcome must be understood and used to make decisions that offer the best options for communities that must accommodate the possibility of hazard activity into the fabric of community life. In so doing, knowledge of the resources and processes required to facilitate adaptive capacity must be made available to communities to ensure that they are in a position to make choices about how they will adapt, or whether to accept the risk posed by a hazard. Communities can influence their risk status (i.e. the kind of outcome they desire) by making choices about the characteristics of their communities and about their relationship with the wider society.



**Figure 3. A risk–resilience–vulnerability management model**

### **Societal resilience**

Several of the variables introduced in the preparedness model, specifically self-efficacy and action coping, together with sense of community, predicted adaptive capacity (e.g. increasing diversity of mitigation measures, developed greater persistence in their application, developing alternative livelihoods, organising collective action to confront hazard effects) in community members confronted by toxic waste, salinity and volcanic hazards (Bachrach and Zautra 1985; Bishop et al. 2000; Paton et

al. 2001). Verifying the utility of this model against several hazards enhances its predictive capability and its utility within an all hazards management approach. The ability of these variables to predict community action suggests the potential for their providing a foundation for a more comprehensive, multi-level model that comprises: a) the resources at individual, community and social levels necessary to support adaptation; and b) the mechanisms that facilitate interaction between levels in ways that promote cohesive action to enhance adaptive capacity, minimise disruption, and facilitate growth. This conceptualises adaptive capacity as the integration of personal (e.g. self-efficacy, sense of belonging), community (e.g. social support, collective efficacy), and institutional (e.g. business continuity planning) levels, and includes the processes required to bind them together (e.g. social justice, community competence, trust, empowerment). If choices are to be made, it is important to understand the nature of the resources required at each level, as well as those required for the successful management of the transactions between levels that facilitate comprehensive adaptive effort. The separation of resources and mechanisms also emphasises the need for the complementary or bi-directional linkages between levels.

People bring key resources to the community. This includes their specific knowledge and expertise, as well as dispositional factors such as their commitment (e.g. sense of community) and self-efficacy. However, within a community, the accumulated depth and breadth of expertise encapsulated in collective community capacity exceeds the sum of its parts (e.g. collective efficacy). With regard to confronting natural hazards, the next question concerns identifying the factors that facilitate the development and sustained existence of this collective capacity.

Equity and fairness regarding the distribution of risk throughout different sectors of the community and community involvement in decision making about acceptable levels of risk and the strategies used to mitigate this risk is important (Lasker 2004; Paton and Bishop 1996). Strategies based on social justice principles, that seek to manage diversity, can inform the understanding of processes that influence risk acceptance and responsibility for safety, and that, consequently, increase collective commitment to confront hazard consequences.

Syme et al. (1992) demonstrated that in establishing dam failure safety levels, communities express a strong desire to become involved in this process, especially if their community could be directly affected by a potential disaster. Moreover, they demonstrated that the allocation of blame is greatly affected by the extent of prior community consultation. Thus, by involving the community in decision making about risk and risk management, citizens become less likely to want to 'scapegoat' those responsible for emergency planning. This discussion illustrates the potential of this process to facilitate links between people, communities and society. This appears to be due to greater community knowledge of the trade-offs involved in creating safer environments. Thus levels of community satisfaction and risk acceptance are increased by consultation based on procedural justice principles. These factors are likely to impact on the resilience of the community after a disaster, and should reduce somewhat the psychological impacts.

A prime candidate for a resource that describes community-society transactions is “community competence” (Eng and Parker 1994). This construct describes a community with regard to, for example, participation and commitment to community issues and the inclusion of members in salient decisions, capacity to articulate collective views, and procedures for managing relations with the wider society. The utility of this construct to predict community adaptation to challenging circumstances has been demonstrated (Eng and Parker 1994). The quality of adaptive capacity is not just a function of the ability of a community to formulate and represent its views. The effectiveness of this will be a function of the degree of civic reciprocity. That is, the degree to which civic agencies distribute power, resources and expertise in ways that empower community members and the degree to which community capacity is sustained by institutional practices and procedures (e.g. empowerment) (Dalton et al. 2001; Rich et al. 1995). These relationships are summarised in Figure 4.



**Figure 4. Multi-level resilience model showing selected resources at each level and selected transactional resources. Contents derived from: Eng and Parker (1994); Lasker (2004); Paton (2000, 2003); Paton and Bishop (1996); Paton and Johnston (in press); Tobin (1999).**

Strong community interest in developing adaptive capacity, and similar interest on the part of planners (institutional level), is important but not sufficient. Communities expressing an interest in participation must have the capacity to formulate ideas, transmit them to institutions, and be able to mobilise and sustain action to implement initiatives within the community. The ability of a community to act in this way will also be a function of the degree to which its actions are reciprocated by institutions (e.g. emergency planning) characterised by the existence of a culture that embraces the value of empowering communities. Mechanisms of this nature will make an important contribution to sustaining capacity during quiescent periods and through periods of (possibly prolonged) hazard response and recovery (Lasker 2004; Paton and Bishop 1996). Once the resources that constitute an effective, comprehensive adaptive capacity are articulated, the next question concerns how this capacity can be developed and sustained. One approach could involve integrating hazard mitigation, response and recovery planning within the community development process.

## **Resilience and community development**

Several studies of adaptation to hazard effects (Bishop et al. 2000; Paton and Bishop 1996; Paton et al. 2001) describe links between individual resilience predictors and involvement in community activities and functions (e.g. membership of clubs or social action groups). These observations illustrate the potential for adaptive capacity to be forged and sustained through community engagement in activities concerned with identifying and dealing with local issues (Duncan et al. 2003; Lasker 2004; Paton 2000; Paton and Bishop 1996; Pearce 2003; Rich et al. 1995).

Participation in identifying shared problems and collaborating with others to develop and implement solutions to resolve them engenders the development of competencies (e.g. self-efficacy, action coping, community competence) that enhance community resilience to adversity (even if not specifically intended as a hazard reduction resource). Given that such activity may be undertaken in relation to a range of more regularly occurring challenges within communities, the latter could be used as a framework within which hazard education could be integrated rather than seeing hazard education as a stand alone activity.

Hazard education could be facilitated by inviting representatives of community groups (e.g. community boards, Greypower, Rotary, religious and ethnic groups) to review hazard scenarios in regard to the potential challenges, opportunities and threats they could pose for each group (Lasker 2004; Paton 2000). The outcome of this process would provide the information and resource requirements necessary for community-led mitigation strategies that are more consistent with the diverse beliefs, values, needs, expectation, goals and systems within a community.

The effectiveness of these activities can be increased when motivated and sustained by active community leadership (Dalton et al. 2001). Lasker (2004) revealed community members' preference for community-based hazard planning to be based around competent and credible individuals from within their community. Some 63 per cent of respondents stated that these community sources should have more than just scientific expertise, with their credibility, the belief that they would have citizens' interests at heart, being endorsed as a key competence by some 84 per cent of participants. For 73 per cent of respondents, close friends and family members were identified as appropriate for this role. Whoever fills this role, a need for them to receive additional training was endorsed by 94 per cent of his participants. This training should extend beyond the ability to give information and advice, and include developing the expertise required to assist them to reconcile the difficult trade-off decisions that arise in reconciling protective actions with people's needs and concerns.

An important conclusion in both the natural hazard literature the importance of mobilising community resources to facilitate adaptive capacity rather than having institutional decisions imposed upon a community. Integrating such natural coping mechanisms with emergency management planning

requires that institutional levels must possess both a culture that espouses empowerment and the mechanisms that facilitate their capability to interact with community members in meaningful ways.

One approach would involve emergency planners assimilating and coordinating the needs and perspectives derived from community consultation, and seeking, as far as possible, to provide the information and resources necessary to empower community groups and sustain self-help and resilience. Emergency management agencies thus act as consultants to communities (e.g. facilitators, resource providers, change agents, coordinators) rather than directing the change process in a top down manner. In addition to its potential for promoting the competence and resilience of community members, this approach encourages them to think about and discuss hazards in regard to the personal and community benefits that accrue from engaging in certain risk reducing activities (Lasker 2004; Paton et al. 2005).

### **Conclusion**

The discussion presented here suggests that it is feasible to develop resilience strategies, at individual, community and societal levels, capable of accommodating natural hazards. In doing so, this discussion focussed on identifying a generic set of variables and processes that rendered the proposed models suitable for application across communities and hazards.

This does not negate the need for mitigation measures to deal with the unique characteristics of each hazard. However, given that many of these unique facets will reflect the particular circumstances that prevail when disaster strikes, the generic models proposed here allow the planning process to develop capacity as much as possible. In so doing, it frees those responsible for event response and recovery management to focus their limited resources on these emergent demands. Deriving estimates of the predictive capability of these variables from empirical assessment allows them to be used to assess levels of resilience, to monitor change, and to evaluate the effectiveness of readiness strategies, irrespective of the 'hazardscape' prevailing within a specific community.

To accommodate community diversity, hazard education programmes designed from this model should be integrated, using a bottom-up approach, with community development initiatives to increase resilience, facilitate self-help capabilities, and reduce reliance on external response and recovery resources. Given the rarity of hazard phenomena, hazard education should be integrated with community programs that sustain active problem solving and community participation in projects and social activities. This can foster and sustain a capacity to adapt to the vicissitudes of life irrespective of their origin.

By ensuring that risk reduction and communication strategies are developed and delivered within a salutogenic paradigm, the potential for adaptation can be optimised, and community development strategies can be more readily integrated with the engineering, lifeline, natural hazard planning and public policy initiatives that comprise comprehensive emergency management. When this happens,

estimates of community capability to adapt to, deal with and develop from exposure to natural disaster will increase substantially, as will confidence in the planning and policies that define societal responsibility and the actions they stimulate to safeguard members of communities at risk.

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