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BUSHFIRE COOPERATIVE RESEARCH CENTRE
PROGRAM C: COMMUNITY SELF SUFFICIENCY FOR FIRE SAFETY

RISK COMMUNICATION PROJECT (C4)

Promoting Household and Community Preparedness for Bushfires:

A review of issues that inform the development and delivery of risk communication strategies

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INTRODUCTION

In communities susceptible to experiencing adverse impacts from bushfire hazards, the active pursuit of strategies to manage the associated risk is essential. This is no easy task. Objectively, risk from bushfires is constantly increasing. Even if the probability and intensity of bushfire hazard activity remains constant, continuing population growth and economic and infrastructure development, particularly within the peri-urban environment, results in a concomitant increase in the potential magnitude and significance of loss and disruption associated with bushfire activity, and consequently, risk. The population growth and infrastructure development that has taken place in the peri-urban fringe has not been matched by a corresponding development of preparedness for bushfires (McLeod, 2003). The lack of such effort highlights a need for risk management strategies to include a focus on increasing household and community preparedness. This provides the general context in which this report is placed. This report reviews the social and psychological factors that influence whether people will decide to prepare for bushfires. Drawing upon research undertaken on bushfires in particular, and natural hazards in general, it discusses some general approaches to incorporating this knowledge into bushfire risk management and risk communication programs based on information dissemination and community engagement activities. The report discusses how research knowledge can be used to:

a. reduce the level of exposure to fire hazards (e.g., prevent incursion of embers into home, minimising fuel levels by creating a defensible space or safe zone around the property to);

b. increase citizens' knowledge and understanding of bushfires and how they can be managed (e.g., knowledge of fire behaviour, how fire interacts with topography/buildings), and
c. increase people's capacity to cope with fire should this eventuate (e.g., having access to hoses and knowing how to use them to extinguish spot fires).

If they are to be fully effective, these measures and competencies must be in place prior to the occurrence of bushfire activity. The principle challenge for fire and other civic emergency management agencies is how to develop and deliver risk communication messages (that facilitate preparedness, knowledge acquisition, and a capacity to deal with hazard consequences) during periods of hazard quiescence when fire and its implications may be the furthest thing from people's minds. Before proceeding to discuss risk communication, it is necessary to define risk.

RISK

For the purposes of this discussion, risk is conceptualized as a product of a) the likelihood (probability) of a hazard event occurring, and b) the consequences of hazard activity (Hood & Jones, 1995). This definition represents risk communication as a process that comprises two general components. The first concerns the probability of occurrence. This element of the risk equation plays a significant role in formal mitigation planning (e.g., prioritizing the distribution of risk management activities, land use planning etc). With regard to communicating with the public, the challenge for risk communication is how to inform the public of the likelihood of bushfire activity in the area in which they live and work. The second component of risk communication focuses on advising people of the consequences of bushfire activity that they may have to prevent, deal with or adapt to, as well as informing them of how they might achieve these goals. The twin goals of risk communication can be

summarised as (a) informing people about the probability of occurrence and the consequences of bushfire hazards and (b) encouraging the sustained adoption of measures capable of mitigating risk and safeguarding household members. Discussion commences with a brief review of communicating about the likelihood of occurrence.

RISK COMMUNICATION AND THE LIKELIHOOD OF HAZARD ACTIVITY

A key issue concerns how the frequency of occurrence of hazard events affects people's perception of risk and the likelihood that they will take action to mitigate this risk. In general, people are more likely to adopt protective actions when they perceive themselves faced with high frequency events, and take fewer precautions for low frequency events, even if the low frequency events can result in substantially greater potential losses (Slovic, Fischhoff, & Lichtenstein, 1982). Bushfires fall into this category. It appears that people edit low probabilities as essentially nil (Stone, Yates & Parker, 1994). People's insurance patterns reflect this preference for recognising higher frequency risks (Slovic, Fischhoff, Lichtenstein, Corrigan, & Combs, 2000). This bias toward high frequency events leaves people more exposed to risk from low frequency, but potentially highly damaging, events, such as bushfires if their interpretation of likelihood information results in their deciding not to prepare for this eventuality.

The bias toward high frequency events occurs partly because the focus of people's interests is biased towards the more immediate future than the long-term outlook. Communication about events whose occurrence may not be imminent is complicated by the fact that communication takes place at a time when hazard is not occurring. With a short-term outlook, the risks from low frequency events seem small. The adoption of a short-term perspective is evident where people do not wear seat belts in countries where this precaution is voluntary,

because they (correctly) perceive the probability of their being involved in an accident on any single trip they undertake as being very low (McClure, 2006).

The challenge for risk communication is to counter this bias about low frequency events. Perception of frequency of occurrence information is affected by the length of time people have lived in areas susceptible to experiencing a hazard (DeMan & Simpson-Housley, 1988), particularly if they have had direct personal experience of hazard activity while living in that locality (Heller, Alexander, Gatz, Knight, & Rose, 2005; McGee & Russell, 2003; Jackson, 1981). With bushfires in any specific neighbourhood, this experience factor may have limited value, due to the low frequency of fire in any specific locality (e.g., suburb vs. region). For example, information that is, of necessity, regional or that covers what a large geographical area rather than pinpointing the risk to an individual household or even immediate neighbourhood, can interact with how people interpret risk information (see discussion of unrealistic optimism below) to reduce the likelihood that any one individual will personalise the information in a way that increase the likelihood that they will act on it. These factors interact to increase the likelihood that risk will be transferred to others. Information on likelihood of occurrence can also interact with people's perception of responsibility, with high levels of risk (probability) information correlating with increased expectations for action from the emergency services, who are often perceived as the responsible agent for bushfire mitigation (Kumagai et al., 2004). Hence, probabilistic data about the likelihood of fire occurring will rarely, in itself, lead to changes in behaviour.

Other strategies can, however, be more effective. Research on seat belt use has shown that people increase their use of seat belts when safety messages shift the person's time frame and inform them of the probability of having an accident over a whole lifetime, rather than the probability of an accident in a single trip (Slovic et al., 1982).

This principle may be applied to the risks from low frequency natural hazards such as bushfires (Slovic et al., 1982; Slovic, Fischhoff, Lichtenstein, Corrigan, & Combs, 2000). If people know the risk of experiencing the hazard over a 25-year period, rather than the risk in a single year, they are more likely to recognize the value of being prepared. That is, preparing is more likely when evaluate probabilistic information over a period of time that approximates more to the period in which they are likely to live in a house or area. Additional research is required to identify what minimum time frame required for this re-framing to occur.

At a more general level, while research suggests that when people believe that hazard activity is likely to occur in the short-medium term (e.g., an event will occur in the next 6 – 12 months – i.e., they assume a probability of 1 for this time frame) is correlated with preparedness (Lindell & Perry, 2000; Paton et al., 2005), judgments of hazard likelihood per se do not predict preparedness (McClure Walkey & Allen, 1999; Mileti & Darlington, 1995; Lion et al., 2004; Sjöberg, 1999). Focusing risk communication efforts on consequences represents a more effective use of resources.

RISK COMMUNICATION AND THE CONSEQUENCES OF HAZARD ACTIVITY

The value of focusing on consequences and what can be done to control them is supported by the prominence of hazard consequences as hazard issues about which people wish to know more (Lion, Meertens & Bot, 2004; Mayer, Davis & Schoorman, 1995). While people are interested in knowing about the likelihood of the occurrence of a hazard, it tends to be significantly less salient for decision making (Lion et al., 2004; Sjöberg, 1999). It is information about the ‘consequence’ side of the risk equation that appears to hold the stronger relationship with peoples’ decisions to prepare for natural hazards.

Preparedness is higher among citizens who perceive that they are likely to suffer negative consequences from an earthquake if they do not prepare (Palm & Hodgson, 1992). This suggests that strategies to increase preparedness, rather than focusing solely on imparting information on the probability of a bushfire, need to emphasize the likely consequences of a bushfire, encourage people to personalise this risk, and to act in ways that will reduce risk. In other words, to develop a societal capacity to co-exist with the potentially hazardous aspects of its environment, strategies should focus on the proactive development of preventive and adaptive capacities that increase household and community member's capacity to mitigate, confront and cope with bushfire hazard consequences. The development of risk communication strategies for the pursuit of this objective is necessitated by the fact that levels of bushfire preparedness remain low.

Household Preparedness

Household preparation for bushfires includes, for example, reducing and preferably minimizing fuel loads to create a defensible space around the home, actively managing vegetation, cleaning leaves from guttering, placing metal flyscreens on windows, ensuring access to water and having the resources (e.g., buckets, mops, pumps, hoses, ladders) to use it to extinguish spot fires, and having access to other protective equipment. Despite the efforts of fire and civic emergency management agencies to inform the public about bushfire hazards and how to deal with their consequences, the goal of ensuring sustained levels of bushfire preparedness has proved elusive (McLeod, 2003; Ellis, Kanowski, & Whelan, 2004). The conclusions regarding the need for greater preparedness for bushfires is echoed in empirical analyses of bushfire preparedness in Australia and elsewhere (Paton et al., in press; Winter & Fried, 2000). These findings are consistent with those associated with other kinds of natural hazards.

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; Cowan, McClure, & Wilson, 2002; Duvall & Mulilis, 1999; Gregg et al., 2004; Hurnen, & McClure, 1997; Lasker, 2004; Lindell & Perry, 2000; Lindell & Whitney 2000; Johnston et al., 2005; McClure, Allen, & Walkey, 2001; McClure, Walkey, & Allen, 1999; McIvor & Paton, in press; Paton, Kelly, Bürgelt & Doherty, in press; Paton, Smith & Johnston, 2005; Paton & Bürgelt, 2005). One reason for this, and the foundation for the discussion presented in this report, is that risk communication research and practice has focused more on the messages it provides to community members rather than on how people interpret this information. Nor has the influence of the relationship between community members and the civic agencies responsible for risk communication on the effectiveness of risk communication received much attention. Both of these are areas whose importance for risk communication is increasingly being recognized. These factors represent the context in which the contents of this review are placed.

When conceptualizing the risk communication process it is pertinent to distinguish between peoples' ability to comprehend a message, the meaning the information has for them, and how this meaning is created and acted upon. This report focuses on discussing risk communication from the perspective of how people interpret risk information in the context of their relationship with the social, civic and natural environments and make decisions about the adoption or otherwise of protective measures accordingly.

This review commences with a brief discussion of the social context and the importance of understanding how risk communication is delivered to communities characterised by diversity with regard to, for example, their history, and the goals, needs, capabilities and expectations of their members. If it is to be effective, risk communication programs must be designed in ways that accommodated this aspect of contemporary community life.

Furthermore, if it is to be effective, risk communication must be delivered in ways that complement the processes by which meaning is generated and sustained within communities.

RESPONDING TO RISK INFORMATION: AN INTERPRETIVE PROCESS

People are not passive recipients of information, even when it is intended to inform them about significant issues in their environment. Rather, they actively and constantly interpret information and events from the environment while they interact with the elements in that environment, and integrate their interpretations of these interactions through a process of reflection with already existing beliefs, attitudes and expectations (Blumer, 1969). 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 (their reality) differs from person to person, changes over time, depends on context, and reflects the unique experiences they have accumulated during their lives (Blumer, 1969). The objective of this interpretative process is to facilitate peoples' ability to adapt as well as possible to their environment. In this context, risk communication complements this process by providing people with knowledge and strategies that can facilitate their capacity to co-exist with the potentially hazardous elements in their environment and to manage the associated risk. Unfortunately, people may not always interpret the information made available to them in a manner that contributes to greater preparedness (Cortner, Gardner, & Taylor, 1990).

For example, 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 fire and other emergency planning agencies, and may result in

outcome, such as reduced preparedness, that are the opposite of what was intended (Paton et al., 2000). Reasons why this might occur are discussed in more detail below.

These interpretive processes must be accommodated in risk communication about bushfires (Kneeshaw et al., 2004; Kumagai et al., 2004; Paton et al., in press). It must also be borne in mind that the misconceptions about bushfires that may prevail within a community can reflect the history and culture of the community and are not likely to be corrected simply by providing people with information no matter how objective and factual it is (Kumagai et al., 2004; Paton et al., in press).

It is also pertinent to accommodate the fact that communities are dynamic entities. They change over time, with increasing levels of community diversity being a common consequence of this change process. Over time, risk communication strategies must change to accommodate changing hazard implications as well as changes in community membership, needs and expectations. For example, migration from urban areas to peri-urban and rural areas has resulted in a growing number of people who do not have neither a knowledge of nor a history of experience of bushfires, and who do not have ready access to the social networks required to build this knowledge and facilitate their preparedness (McGee & Russell, 2003). Kumagai and colleagues also highlighted how experience with bushfire can make a unique contribution to this diversity. They describe how interpretation of a fire experience may exercise a prolonged influence on community attitudes (Kumagai et al., 2004; Vogt et al., 2005), and not necessarily in ways that increase the likelihood of future preparedness.

Communities are thus becoming increasingly diverse, resulting in the social context in which information is received being characterized by correspondingly varied experiences, beliefs, needs and expectations. Given the evidence that risk communication must be tailored to the needs of recipients (Cosgrove et al., 1996; Jakes et al., 2003; McGee & Russel, 2003; Paton & Johnston, 2001; Rohrman, 1995), it will become increasingly difficult for general

risk communication programs to cater for this diversity. A failure to accommodate this diversity can diminish the capacity of mass media information dissemination strategies, which characterises much contemporary risk communication, to facilitate the adoption of protective actions (Paton, Smith & Johnston, 2000; Paton et al., 2005; Johnston et al., 2005; McGee & Russell, 2003; Paton & Bürgelt, 2005). These authors found that community members commonly perceived the hazard-related information presented to them as lacking sufficient specificity to meet their needs. Consequently, by failing to consider, for example, the history, beliefs and expectations of its recipients, this information failed to help them understand either complex hazard issues or why specific actions on their part were required to mitigate them, and failed to motivate actions that would assist adaptation to hazard consequences.

Thus, when designing risk communication and planning its delivery, it is important to understand that people make judgements about the information presented to them and actively interpret it within frames of reference that can differ, sometimes substantially, from their scientific and civic counterparts who develop and deliver risk messages. It is not information per se that determines action, but how people interpret it (e.g., render it meaningful) in a context defined by their personal and community expectations, experience, beliefs and misconceptions about hazards, the actions proposed to mitigate their adverse consequences, and the sources of information (Dake, 1992; Dow & Cutter, 2000; Kneeshaw et al., 2004; Lasker, 2004; Lion et al., 2004; Marris et al., 1998; Rippl, 2002; Paton, 2003), with people actively evaluating the relevance of information for them accordingly. This can result in people being disinclined to attend to information they perceived as inadequate to meet their needs or to interpret it in ways that differ from that intended by the fire and civic agencies who produced the messages. Hence, to facilitate the adoption of protective measures, it is important to understand how people interpret information about hazards and

make decisions about how they will deal with hazard consequences based on their interpretation of the messages.

If the key elements of this process can be identified, this knowledge can be used to design risk communication strategies that can more effectively tailor messages in ways that will encourage the sustained adoption of protective measures. When pursuing this issue in the context of bushfire preparedness, both individual and collective levels of analysis must be included. A unique aspect of bushfires is that effective risk reduction involves actions at both household and neighbourhood levels.

Household strategies are necessary to accommodate diversity in composition and pre-existing levels of knowledge and preparedness. However, to make a substantive contribution to risk management, these must be complemented by facilitating collective actions. For example, the effectiveness fuel reduction measures is a function of the number of adjacent households that do so. Collective support is also important when seeking support for mitigation measures such as controlled burning (Kumagai et al., 2004). While these obviously occur seamlessly in real life, the processes are discussed separately here. This approach makes it easier to identify the issues that have to be taken into account when designing and delivering risk communication programs.

In the next section, the report focuses on factors that operate primarily at the household levels (see Figure 1). To demonstrate how household and community factors interact, a model of the relationship between individual- and community-level factors will be presented (see Figure 2) and used to illustrate how they interact to influence whether or not people prepare. Before proceeding to do so, the role of demographic factors is briefly reviewed.

Levels of preparedness have been linked to demographic factors such as home ownership, income, education, marital status, number of children living in the home, number of years residing in a neighbourhood, and hazard experience (Russell et al., 1995). However, while

providing some valuable insights into the contextual factors that must be considered, these factors do not lend themselves to the design of practical intervention strategies (i.e., fire agencies cannot change marital status, number of children living at home etc).

Furthermore, a focus on these factors may conceal the dynamic processes that underpin how people, irrespective of their specific demographic constitution, make decisions about whether to prepare or not. For example, prior experience has been linked to both greater and reduced levels of preparedness. Lindell & Perry (2000) found that direct experience loss or indirect experince through losses to family and friends increased subsequent preparedness. Other studies (e.g., Paton et al., 2001; Whitehead et al., 2001) found the opposite, with direct experience predicting reduced preparedness.

One explanation for this has been framed in terms of the "gamblers fallacy" in that if people experience one event they believe they are less likely to experience a future event. They are, consequently, less inclined to prepare. Vogt et al. (2005) found that once beliefs about bushfire and the personal importance attributed to them and their management were controlled for, previous experience ceased to predict levels of preparedness. Thus, analysis based on assessing previous experience alone tends to conceal the underlying reasons for the actions that ensue. If, however, the focus is on the underlying reasoning processes, it becomes easier to appreciate why previous experience can lead to both an increase and a decrease in future preparedness (i.e., as a result of how people interpret events).

It is thus more important to understand how the beliefs derived from experience (i.e., how experience is interpreted) influence the relative importance that people ascribe to bushfires than to assume that experience, in itself, will always constitute a valid predictor of preparing (Kumagai et al., 2004; Paton et al, 2005; Paton et al., in press).

Evidence-Based Approaches to Facilitating Natural Hazard Preparedness

Several theories of behaviour change that have scientific credibility have been applied with some effectiveness to influencing natural hazard preparedness. These theories possess several common features. A common denominator between them is recognition that simply giving people information about risk or a specific hazard will not be sufficient to get them to prepare for hazards, particularly hazards that have a low frequency, such as bushfires (Chaiken, 1980). Indeed, this well-intended but naïve strategy can have adverse effects (Paton et al., 2000; Paton, Smith & Millar 2001). Theories that have used to provide a framework for developing understanding of hazard preparedness include the Theory of Planned Behaviour, the Theory of Goal Achievement and the Person relative to Event Theory.

The theory of planned behaviour proposes that behaviour is a product of intentions, which are in turn predicted by three factors: people's attitude toward the target behaviour, their 'perceived subjective norm', which includes their judgments about social pressures to perform an action, and their perception of behavioural control or self-efficacy, which refers to people's perception of how difficult it is to perform the target behaviour or their beliefs in their ability to tackle a novel activity (Ajzen, 1991). The theory also claims that people's response to a situation (e.g., their preparing for a hazard) is affected more by their beliefs about the effectiveness of a given behaviour (e.g., whether they believe it can actually make a difference) than by their beliefs about the hazard that warrants action. The ability of this model to predict preparedness has been supported by research on earthquake (McIvor & Paton, in press; Paton et al., 2005) and bushfire (Bright et al., 1993; Fried, Winter & Gilless, 1999; Paton et al., in press; Pouta & Rekola, 2001; Vogt et al., 2005) hazards.

The theory of goal achievement proposes that people are more likely to achieve their goals if they form implementation intentions (Gollwitzer, 1999); that is, if they work out the specific means by which they will achieve the goal (e.g., first planning how they will achieve

something). This strategy involves three elements: the when, where, and how of attaining the goal. The theory claims that implementation intentions enhance goal attainment because they help people to retrieve their intentions from memory – in other words, if people do not form implementation intentions, they tend to forget their goal. The theory recognises that the effectiveness of intentions depends on the strength of a person's commitment to the goal (e.g., how important it is to them) (Gollwitzer, 1999).

The 'Person relative to Event' theory (PrE Theory) (Mulilis & Duval, 1995), applies ideas about the ways people cope with stress to hazard preparedness. It distinguishes between problem-focused coping (actions taken to address the cause of a problem directly), and emotion-focused coping (people's attempts to alleviate the negative emotions associated with a problem) (Lazarus & Folkman, 1994). In terms of hazard preparedness, problem-focused coping involves actions that aim to reduce the risk of damage and minimise the negative consequences of damage. The PrE model specifies the conditions that foster problem-focused coping in response to negative threats. The model claims that problem-focused coping occurs only if the magnitude of a threat is exceeded by the person's resources to deal with the threat (Mulilis, Duval, & Bovalino, 2000). If people believe that their resources are high, then when the threat increases preparedness increases. If they believe that their resources are low, then as the threat increases their preparedness decreases.

These theories make complementary predictions and suggest that risk communication is more likely to be effective when intervention:

- Focuses on specific actions (and why they are likely to work), rather than broad classes of action;
- Develops implementation intentions that specify how the (specific) actions will be carried out and a specific time frame for carrying it out;

- Foster action or problem-focused coping that focuses on solving the problem, rather than emotion focused coping that focuses on dealing with the negative emotions triggered by an event; and
- Foster recognition that most people can access at least some of the resources required to reduce their bushfire risk.

The elements in these theories have been integrated to provide a composite model of the risk communication process. The model is summarised in Figure 1. This model identifies the kinds of issues people face as well as the kinds of decisions that people must contend with if they are to adopt preparedness measures. Figure one also illustrates how the different elements are related to one another.

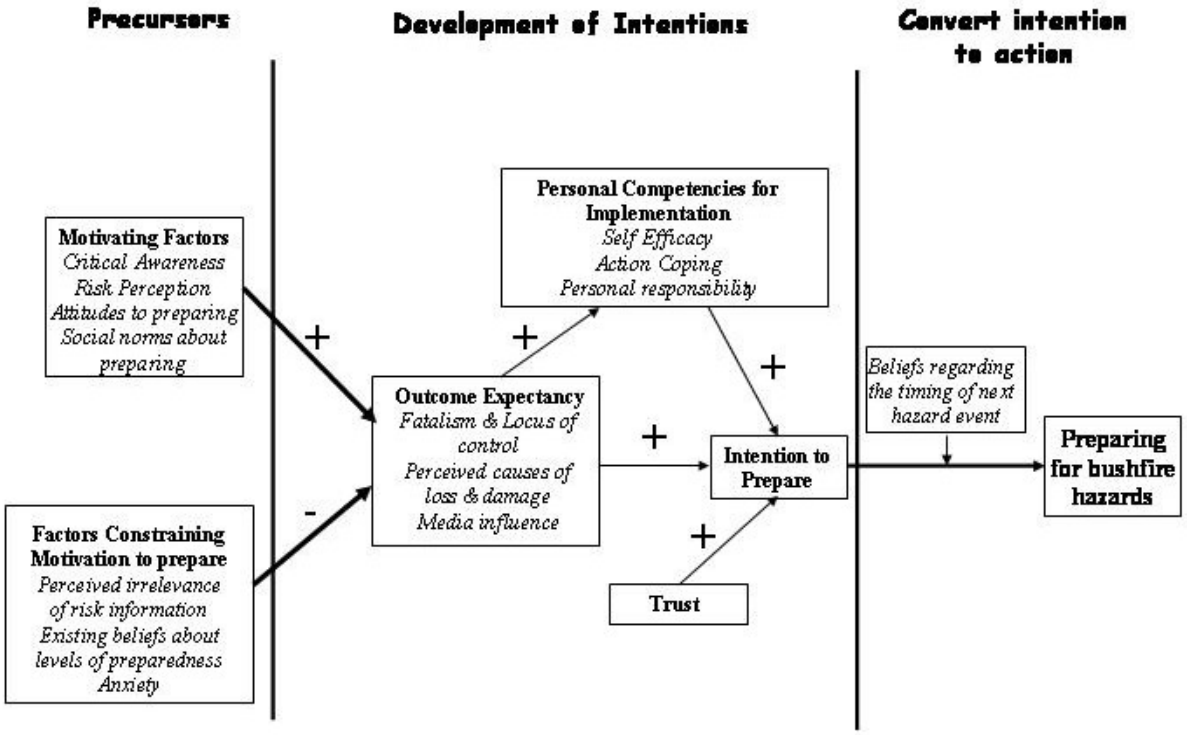

Figure 1: The preparedness process (adapted from Paton et al. (2005), Paton et al., 2006; McIvor & Paton, in press)

The model comprises factors that reduce motivation to prepare, factors that increase motivation, and factors that facilitate the conversion of this motivation into implementation

intentions and actual preparedness. Discussion commences with consideration of factors that directly reduce the likelihood that people will prepare.

FACTORS CONSTRAINING MOTIVATION TO PREPARE

Perceiving Risk Information as Irrelevant

Discrepancies between civic agencies and citizens' perceptions of risk can arise because the latter base their estimates on the relationship between hazard activity and personally salient issues. Bishop et al. (2000) and Paton et al. (2001) found that perceived risk was determined less by hazard characteristics per se and more by the extent to which people believed that hazard activity could exercise a direct and adverse impact on their livelihood. Information on the hazard itself may thus not be meaningful enough to motivate action.

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.

Hazard information may be perceived as irrelevant if people over-estimate their knowledge of preparedness (Paton et al., 2000) and/or when they assume levels of preparedness that are discrepant with actual levels (e.g., assume preparedness measures are in place because they were at some point in the past) (Charleson, Cook & Bowering, 2003; Lopes, 2000). Over-estimates 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).

People's interpretation about what constitutes adequate preparation will also influence the perceived relevance or otherwise of risk communication. Paton & Bürgelt (2005) described how residents' beliefs regarding sufficient preparedness for bushfires ranged from just mowing the lawn regularly to implementing multiple preparedness measures. If people believe their current actions are sufficient, they are less likely to listen to risk messages or to act on their recommendations. Paton & Bürgelt 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. If people's interest is triggered by proximal factors, they are less likely to attend to information disseminated at other times. When they do decide they need to act, the stress that could be associated by having to make decisions when an active fire front approaches, may reduce their ability to appraise and act upon it.

For some people, information about bushfire risk is perceived as irrelevant (Paton & Bürgelt, 2005). Discussion with people in areas susceptible to earthquake and bushfire hazards suggest that risk communication is rendered more relevant when 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 to protect these important elements (Paton et al., 2001). It is also important to complement this process with efforts to develop people's understanding of the relationship between hazard activity and associated losses and to provide specific information regarding why each recommended action will result in increased

safety or reduced losses (see below). The lack of such knowledge tends to increase hazard anxiety and reduces the likelihood that people will prepare.

Anxiety & Denial

Anxiety can reduce the likelihood that people will prepare for bushfires (Paton & Bürgelt, 2005). Hazard-related anxiety can reduce peoples' willingness to attend to risk messages or act on them. If people manage their anxiety by insulating themselves (denial) from information that triggers feelings of anxiety, the likelihood that they will prepare will diminish (Duvall & Mulilis, 1999; Lamontagne & LaRochelle, 2000; Paton et al., 2005).

Denial is a way of coping with an anxiety-producing event. This involves the person denying the seriousness of the risk in order to reduce their anxiety. In a New Zealand study of the causes of earthquake damage and its preventability, risk perception was found to be influenced by peoples' degree of exposure to earthquakes and their knowledge of the hazard (Crozier, McClure, Vercoe, & Wilson, in press). People living in high and low hazard zones either received full information (including maps) about their zoning or received no information about their zoning. In low hazard zones, the zoning information led citizens to judge potential earthquake damage more preventable than citizens who received no such information, whereas the same information in high hazard zones led citizens to judge that the damage couldn't be prevented. In other words, risk communication in high risk zones had a counter-productive effect by increasing denial of risk and fatalism (see also Paton et al., 2001). People who had adopted fewer mitigation measures tended to underestimate the likelihood that damage would occur to them to a greater extent. This suggests that people who make fewer precautions cope with the threat from a hazard by denying its likelihood (DeMan & Simpson-Housley, 1988) rather than it acting as a catalyst for preparing. It can be inferred from this that people can get into a negative spiral of ever-reducing preparedness.

Low initial preparedness can, on being given information about levels of risk, increase anxiety. This, in an attempt to control anxiety, leads to denial of the risk which, in turn, reduced preparedness, and so on.

In this context, risk communication strategies capable of countering people's denial of their risk will be important. Denial is difficult to change, because it serves a functional role in reducing people's anxiety. However, it can be reduced if people believe they have some control over the hazard, or when they learn that they can have some control over it (Lehman & Taylor, 1988; Mulilis & Duval, 1995). The effectiveness of this approach rests on it being accompanied by risk communication components that explain the specific relationship between hazards and their consequences and how specific measures can reduce or eliminate the likelihood that a person will experience adverse consequences from hazard activity. It is also necessary to consider the beliefs that people have regarding the consequences of hazard activity. Unfortunately, with regard to bushfires, people tend to favour causal explanations that emphasis factors they perceive as uncontrollable (Kumagai, et al., 2004). These issues are discussed in more detail below.

While these factors, the perceived irrelevance of risk information and anxiety/denial reduce the likelihood that people will prepare, two prominent motivators influencing preparing are threat/risk perception and critical awareness. It is to a discussion of these two factors that this review now turns.

FACTORS MOTIVATING PREPARING

Risk Perception

Unless a person perceives themselves as susceptible to threat from hazard activity, it is unlikely that they will be motivated to deal with it. This is the premise that underpins

presenting information on the threat posed by a hazard in risk communication programs. The use of this approach is based on the assumption that informing people of the general threat posed by a hazard will encourage people to act in ways that will reduce their risk. However, the effectiveness of this approach can be constrained by several factors.

Civic and scientific sources, who design risk communication programs, derive their judgements 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 and act accordingly. This assumption is unfounded. Peoples' interpretation of risk may not share the relative objectivity that characterises 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. The reasons why peoples' estimates of risk can differ from their civic counterparts is illustrated by discussing how expectations, cognitive biases and social processes influence this discrepancy.

People's concern about risks often bears little relationship to the objective probability of their being harmed by those hazards (Slovic et al., 1982). Several factors can be proposed to account for this phenomenon. Slovic, Fischhoff and Lichtenstein (2000) identified three underlying factors in people's perceptions of hazards. The first factor, *dread*, comprises risk features that are: uncontrollable, globally catastrophic, hard to prevent, fatal, inequitable, threaten future generations, produce feelings of dread, hard to reduce, increasing in number, involuntary, and personally threatening. The second factor, *familiarity*, comprises observability, scientific knowledge, the immediacy of consequences, personal familiarity and lack of novelty. The third factor was the number of people exposed. Hazards high on the dread factor included nuclear power, nuclear weapons, nerve gas, terrorism, warfare and crime. Nuclear power was rated a high risk despite the low annual fatalities ascribed to it,

which suggests that the combination of high dread and low familiarity influence risk perceptions.

This work raises a question. If dread (potential for catastrophe, hard to prevent etc) and low familiarity influences risk perception, why are natural hazards such as bushfires not perceived similarly. Brun (1992) found that although "human-made" risks were characterised by the number of fatalities and dread, the risk associated with natural hazards was predicted primarily by novelty and delayed consequences, and only secondarily by dread. People saw the time frame (i.e., frequency) as more salient for natural hazards, and saw catastrophe as more characteristic of "man-made" hazards. Given that low frequency information tends to be discounted (see above), natural hazards may not be perceived as high-risk hazards and, by inference, less likely to motivate the adoption of protective measures. While people may under-estimate the significance of likelihood information, fire and civic agencies do not. The discrepancy between these views has additional implications for how people interpret their need for preparing.

Risk Compensation

An interesting finding that has emerged form several studies of risk communication has been a link with it actually reducing future preparedness (e.g., Paton et al., 2000). A discrepancy between expert and citizen estimates of risk can reflect citizens' tendency to overestimate the capacity of hazard mitigation strategies (e.g., controlled burning) to eliminate a threat. This overestimation reflects the operation of an interpretive bias known as risk compensation (Adams, 1995). This process has also been called the levee syndrome. This construct describes how people maintain a balance between the perceived level of safety proffered by their environment and their level of perceived risk and their need to adopt protective actions themselves.

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 by civic agencies about the structural mitigation work they have undertaken to the public (which assumes that peoples' behaviour will remain constant) has been linked to reduced levels of both perceived risk and preparedness in households, and an increased likelihood of citizens transferring responsibility for their safety to civic authorities (Hurnen & McClure, 1997; Paton et al., 2000). Other cognitive biases can result in risk being transferred to other members of the community.

Unrealistic Optimism

Risk perception can be influenced by people making judgements derived from comparisons with 'other people' rather than on a more objective assessment of environmental threat. This manifests itself as a phenomenon known as 'Unrealistic Optimism' (Weinstein, 1980) that refers to a common bias in thinking where a majority of people think that by comparison with the average person, they are more likely to have a happy future and less likely to suffer misfortunes. This optimism can have beneficial consequences under normal circumstances. For example, it can increase persistence when pursuing personal goals. However, when people are faced with the task of estimating their risk of exposure to natural hazards it results in their underestimating their own risk. This bias has also been referred to as the illusion of personal invulnerability. People know that unfortunate events happen, but they believe that they will not be among those suffering from these events. They think it will happen to someone else.

For example, in a study of people's beliefs about the consequences of an atomic bomb landing in Chicago, USA (Burton, Kates & White, 1993), people believed it would kill 97%

of the local residents. However, when asked to predict what they themselves would be doing after the bomb exploded, more than 90% believed that they would be helping to bury the dead or taking care of themselves; only 2% thought that they would be dead. Similarly, Mileti and Darlington (1995) found that people residing in an earthquake risk zone in the USA expected that an earthquake was likely to occur in the next 5 years, but they were optimistic that they would not suffer personal loss. Research in Wellington (NZ), people judged that they were less likely to suffer harm in an earthquake compared with people they knew (Spittal, McClure, Siegert, & Walkey, 2005). As Lindell and Perry (2000) point out, these findings show that people who are at risk fail to personalize the risk. Instead, they may transfer risk to others.

With regard to natural hazards, 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 has been found for bushfire (Paton et al., in press) and earthquake hazards (Lindell & Whitney, 2000). For example, Paton et al. (2005) asked people to rate how prepared they believed they were for a bushfire. Next they asked people to rate, relative to themselves, how prepared they thought other people in their community were for a bushfire. The latter were perceived as being significantly less prepared. People consistently rated themselves as being better prepared than average. The existence of this statistical anomaly (i.e., unrealistic optimism bias) means that while people may accept the need for greater preparedness (and may well understand the content of risk messages), they perceive this information as applying to others but not to themselves (Burger & Palmer, 1992; Paton et al., 2000; Weinstein, 1980). In so doing, they transfer risk to others within their community rather than accepting this risk themselves. 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.

What can be done to counter this (unrealistic) optimism about one's vulnerability? Perception of personal invulnerability can be challenged by personal experience of hazards (Greening & Dollinger, 1992). Burger and Palmer (1992) showed that shortly after experiencing the 1989 Loma Prieta, USA, earthquake, illusions of invulnerability had dissipated. However, it re-emerged some three months later. In another study, Helweg-Larsen (1999) found, in the aftermath of the 1994 Northridge earthquake, no unrealistic optimism about risk from earthquakes either immediately after the earthquake or five months later. These findings suggest that people who experience a disaster may not subsequently hold an unrealistic optimism about their risk from a similar disaster. However, it is not clear how long this lasts.

Fire and civic agencies interested in encouraging preparing for bushfires clearly cannot produce sample bushfires to counter this optimistic bias. However, people can be influenced by disasters without being victims of those events, particularly if the disasters are salient or relevant (e.g., people can relate to the event or those affected) (Taylor & Fiske, 1978). Interviews with residents in suburbs with high bushfire risk described how sharing stories of bushfires and how to deal with them with others in their community was an important influence on their level of bushfire knowledge and the protective actions adopted. They also believed that these discussions helped to normalise these actions and encouraged preparing to become established within the culture of their community (Paton & Burgelt, 2005). These comments reiterate the importance of discourse in the process of how people construct models of environmental risk and its management (e.g., Lion et al., 2004) and highlights the importance of risk communication must engage community members within the process.

Intervention to reduce unrealistic optimism can also involve giving people lists of possible precautions taken to reduce particular risks, where the information had been compiled by other people (Weinstein, 1980). These findings show that unrealistic optimism about hazards

may be reduced by making people aware of hazards that have harmed other people (with whom the target audience can identify) in similar settings and by telling them about precautions that other citizens have carried out. These strategies may be more effective in facilitating risk acceptance than taking the apparently rational route of telling people about their risk (Chaiken, 1980).

To summarize the content of the above discussion, if people overestimate their existing knowledge and preparedness and base their decisions about their preparedness needs on beliefs that existing levels are sufficient, make judgements based on inappropriate comparisons with others, transfer responsibility for action to others, or wait until certain proximal cues are present in their environment, they are less likely to attend to risk information during about bushfires. 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).

The Importance of Hazard Issues in a Community:

Critical Awareness

Preparedness is influenced by personal knowledge about hazards (Tierney et al., 2001). However, from a risk communication perspective, a key issue is the source of the information from which personal and community knowledge derives. Although civic fire and emergency management agencies are the obvious choice as sources of information, they may not be the best placed to deliver it. Reasons why this may be so are discussed below in the context of the role of social trust in the risk communication process. Another source of information is the media. Again, information from this source may not always act to inform preparedness, and the conditions that must be met for media reporting to complement risk management

strategies are outlined below. The reasons for mentioning the fact that conditions apply to these sources being effective was to introduce the fact that information is available from different sources. These sources can be differentiated on several dimensions. For example, they differ with regard to the degree to they impose information on people, as well as people's history of accessing and using the information they provide. They differ in the relative importance attributed to them by community members, and with regard to their core objective. For example, media information may relate more to the story they wish to relate or the perceived newsworthiness of the item, with imparting risk information to the community being a secondary objective. The importance of understanding this context is further heightened by the fact that the most important source of risk information, at least with regard to its perceived credibility and ability to trigger action, is the community itself. Evidence is accumulating to support the fact that preferred sources of hazard and mitigation information are those within the community, particularly when respected community members have received training that facilitates their capacity to assist their fellow community members not specific enough (McGee & Russell, 2003; Lasker, 2004). This highlights a need for risk communication to be developed and delivered in ways consistent with principles of community engagement. In this section, the role of people's discourse is considered from three perspectives: the perceived importance of hazards, community leadership, and levels of social cohesion.

The perceived importance of hazards for community members

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., 2007; McGee & Russell, 2003; Paton, 2003; Paton et al., 2005; Turner et al., 1986), is a significant predictor of whether people prepare for bushfires (Paton et al., in

press; Vogt et al., 2005) and for predicting levels of support for natural resource management activities (e.g., reducing fuel loads) (Bright & Manfredo, 1995; 1997) that have implications for bushfire mitigation.

People living in areas with a high bushfire risk identified how sharing real-life stories of bushfire experiences with others in their community helped distribute realistic knowledge about bushfires, their consequences, and how and why and how to prepare for them (Paton & Bürgelt, 2005). McGee and Russell (2003) found that parents and friends, particularly those with prior bushfire experience, were good sources of information about bushfires and preparedness activities. In the context of the inherent diversity of contemporary communities, this makes sense. Only with good 'inside information' would it be possible to discuss complex, contingent phenomena like bushfires in ways that are consistent with the prevailing social context (Larson & Dearmont, 2002; Paton, in press; Tierney et al., 2001).

Community leadership

Other work (Dalton et al., 2005; Johnston et al., 2005; Lasker, 2004; Paton et al., 2005) discussed community members' view that the relationship between community discussion and preparing was strengthened by the involvement of respected and knowledgeable community members. McGee and Russell (2003) discussed how those residing in a community who were also members of the local volunteer fire brigade were identified as the most valuable source of fire and preparedness information.

The credibility of these community leaders derives from their knowledge of the local situation and the hazard, their ability to use this knowledge to assist others to develop their household emergency and evacuation plans, and their ability to reconcile mitigation actions with people's needs and concerns. This process also illustrates how being embedded in social networks that sustain a sense of connectedness to a community influences decision making.

Social cohesion

Social cohesion and participation in community activities have been identified as predictors of preparing in other contexts. Tierney et al. (2001) noted that preparedness was more likely when residents were socially linked to their community. Turner et al., (1986) described how "bondedness" (e.g., length of residence in a neighbourhood, identification of the neighbourhood as home, participation in community organization, and the presence of friends and relatives nearby) predicted preparing for earthquakes. The influence of informal and formal meetings of local residents on preparedness was also recorded by McGee ands Russell (2003). The importance of this was evident in different levels of preparedness between established families and those new to the area. The latter group lacked ready access to established social network with high levels of tacit knowledge of bushfires. They identified this as a constraint on their understanding of bushfires and whether they would prepare for their consequences.

Given that discussion of hazard issues is linked to participation in community activities (e.g., membership of clubs or social action groups) (Bishop et al., 2000; McGee & Russell, 2003; Paton et al., 2001; Paton & Bürgelt, 2005), critical awareness could be increased by inviting representatives of community groups (e.g., community groups, workplaces, schools and parent-teacher groups, Rotary, religious and ethnic groups, community fora) to review hazard scenarios with regard to how to deal with the potential challenges, opportunities and threats they could pose for their members (Lasker, 2004; Paton, 2000; Paton, 2005) and provide focused discussion on why issues have significant implications. This will help elevate hazard issues up the attitude ladder.

To expedite this process, it is first necessary to identify why some groups ascribe considerable importance to bushfires, while others do not. Important influences on the

relative importance of bushfires are peoples' attitudes and the social norms prevailing within a community (Kneeshaw et al., 2004).

Attitudes to Bushfires and Bushfire Mitigation

While people hold attitudes to most of the issues that impinge upon them, they are not given equal importance. Rather, they are organised hierarchically according to their relative importance (Bagozzi & Dabholar, 2000; Bright & Manfredo, 1995; 1997; Hardin, & Higgins, 1996). For example, more salient beliefs regarding crime or health care issues may subjugate their natural hazard counterparts as determinants of action.

People's attitudes can also comprise several components, with these elements influencing whether people will support mitigation actions. This has been demonstrated for bushfire mitigation (Bright & Manfredo, 1995; 1997; Kneeshaw et al., 2004). For example, Kneeshaw and colleagues found that peoples' support for mitigation measures was influenced not by the likely occurrence of fire per se but by, in order, whether people believed it was likely to affect private property, rates of forest recovery, whether the fire was of natural or human origin, and the implications of mitigation measures for recreation activities. Factors such as safety, resources at risk, public opinion have also been identified as salient influences on the relative importance of bushfire mitigation attitudes (Kneeshaw et al., 2004).

Support for mitigation measures can be influenced by conflict between attitudes. For example, interviews with people living in high bushfire risk areas (Paton & Bürgelt, 2005) found 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 destroy the environment they value.

Thus, even if people have a positive attitude to bushfire mitigation or risk reduction in general, this does not guarantee its translation into protective actions. During periods of

hazard quiescence, if environmental attitudes are more salient than those for public safety, support for mitigation measures that adversely impact the natural environment will be constrained. While attitudes to public safety will predominate during fire events, risk management activities undertaken during fire to, or during the early part of, the fire season must consider the issue of attitude salience.

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 within a community. The judgements 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. Recent work provides empirical support for this view (McIvor & Paton, in press). They found that attitudes and social norms regarding hazards influenced the formation of intentions to prepare for earthquakes. If people believe others would value such actions, the likelihood of adopting a protective measure is greater, and vice versa.

For example, Paton & Bürgelt (2005) found that beliefs regarding what others would thought about bushfire mitigation and the possibility that social disapproval or legal actions could accompany certain actions (e.g., clearing shrubs from around a property) resulted in people deciding not to prepare for bushfires. 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. This provides additional insights into reasons why community engagement can make an essential contribution to effective risk management.

In McIvor and Paton's work, 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.

This issue is discussed here in relation to peoples' beliefs about the distribution of responsibility for preparing and public safety, beliefs regarding the capacity of the recommended measures to reduce risk, and their beliefs in their competence to implement the recommended actions. These issues are addressed in the next section.

FORMING INTENTIONS TO PREPARE

Responsibility

A link between residents' perception of their responsibility and preparedness has been noted (Lindell & Whitney, 2000). Paton (2003) also showed that it is important that people perceive themselves as responsible for preparation, rather than assuming that it is solely the job of government or local bodies. Research has shown that some public messages can produce the opposite effect to that intended, in that they lead to people getting the idea that the organisation sending the message is doing something about the risk, and that they themselves are not responsible for countering the risk (Paton, Smith & Johnston, 2001). Hence messages to the public need to spell out the boundaries between public and private responsibilities.

Other work has highlighted an interesting discrepancy. While some groups have readily identified the importance of their taking responsibility, they continue to demonstrate a reluctance to act on this belief and to prepare for bushfires (Kumagai et al., 2004). Two possible explanations have emerged to account for this discrepancy. The first reflects the fact that people are more likely to interpret the causes of damaging bushfire consequences as arising from sources other than their own action. So, even though they see themselves as

having some responsibility to act, their beliefs about causation mitigate against their being able to do so. This explanation is consistent with another explanation. While people may see themselves as responsible, they interpret this in terms of having some responsibility for assisting the fire brigade (rather than as taking primary responsibility themselves) (McGee & Russell, 2003). This work also introduces a need to consider the issue of enhancing responsibility from the perspective of people's beliefs regarding the causes of bushfire consequences.

Outcome Expectancy: Can it work?

When considering how people make decisions about whether or not to prepare, it is useful to distinguish between beliefs about a hazard and beliefs about the efficacy of preparedness measures proposed to reduce risk or increase safety (i.e., can they actually work?) (Duval and Mulilis, 1999; Lasker, 2004; Lindell & Perry, 2000; Mulilis & Duval, 1995; Paton, 2003; Paton et al., 2005).

Research on this question has revealed that beliefs about the efficacy of protective actions are better predictors of decisions to prepare than beliefs about the hazard. People can have a high levels of knowledge of the hazard and high levels of risk acceptance, but this does not necessarily encourage them to prepare for bushfires (Paton & Bürgelt, 2005). Given that this is typically the focus of risk messages, it is clearly important that fire and other agencies develop risk communication strategies that focus messages more on beliefs about protective actions and why they work, and not just on providing information on the hazards or the likelihood of their occurring. Duval and Mulilis' (1999) Person-relative-to-Event theory (see above) describes how preparing is 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 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, 2001) as a predictor of their adoption.

This aspect of decision making has been labelled Outcome Expectancy or Response Efficacy. The term describes beliefs regarding whether a given measure can actually be effective in reducing risk. This, in turn, reflects the interaction between beliefs about the causes and magnitude of the hazard consequences (e.g., how catastrophic it is) and a person's knowledge and understanding of the nature of fire behaviour and how it interacts with natural and built environment features. Collectively, these elements combine to determine people's beliefs about the outcomes (e.g., increased safety or reduced risk) that will ensue if a particular action is undertaken. Hence, outcome expectancy plays a key role in decision making about preparing. Outcome expectancy has a significant influence on preparing for bushfires (Paton et al., in press; Vogt et al., 2005).

If the factors that influence outcome expectancy can be articulated, this knowledge can inform the design of risk communication programs. In pursing this objective, discussion here considers how personal factors (fatalism and locus of control), perceptions of the causes of loss and damage from a hazard, and media coverage influence the perceived effectiveness of mitigation measures and this influences whether or not people decide to prepare.

Fatalism and Locus on Control

Fatalism - the belief that the destructive effects of a hazard are inevitable – has a significant influence on people's beliefs regarding the preventability or otherwise of natural hazard consequences and thus on whether or not they prepare for them (Turner, Nigg, & Paz,

1986). Fatalism relates to locus of control. People who have an internal locus, who believe their circumstances reflect their own actions, exert more control over their environment than those with an external orientation, who believe that circumstances reflect societal forces and/or chance factors (e.g., fate) (Strickland, 1989). People with an internal locus are more likely to prepare for tornadoes (Rustemli & Karanci, 1999; 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 outcomes to uncontrollable causes, or generalize from genuinely uncontrollable events to the consequences of these events (over which control could be exercised – particularly if people are prepared), and so remain passive (Abramson, Seligman, & Teasdale, 1978; McClure, 1985). For example, people may assume that because the causes of bushfires cannot be controlled (e.g., natural causes), their devastating effects are also uncontrollable (Kumagai et al., 2004). However, while the event might be uncontrollable, the magnitude of the consequences can be influenced by personal actions. Thus, risk communication must focus on differentiating the uncontrollable event (i.e., the bushfire) from the controllable consequences (e.g., reducing combustible material in the immediate vicinity of the home), and emphasise the importance of the latter (Kumagai et al., 2004; Paton et al., in press).

Consequently, preparedness could be enhanced by changing people's locus of control beliefs towards a more internal locus of control. However, this is not a straightforward task. These beliefs often have entrenched cultural, social and psychological roots, and are not simply reversed by exposure to a factual message. However, they can be modified when risk communication strategies present people with scenarios that contain elements over which most people would be able to perceive themselves as having some measure of control and

where the specific relationship between mitigating actions and positive outcomes can be demonstrated (Strickland, 1989; Turner et al., 1986).

For example, Turner et al. (1986) asked people if they thought anything could be done to help more vulnerable groups, such as people living in unsound buildings and children in schools. When people focused on these specific targets, they became less fatalistic and thought that preventive action would be helpful. Similar findings were obtained by Flynn, Slovic, Mertz, and Carlilsle (1999). Likewise, when peoples' attention is shifted from the awe-inspiring and devastating aspects of the hazard (e.g., scale, area burned) to specific groups and concrete actions that can protect members of these groups, their outcome expectancy, and the likelihood of their preparing, increases (Charleson, 1991; Smith, 1993). This requires some understanding of the relationship between fire characteristics and damage so that people can more readily understand how specific outcomes can be prevented by the performance of specific actions. This involves focusing more specifically on assisting people to understand the relationship between fire characteristics and the loss and destruction that can occur when it comes in contact with the built environment.

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 control can be demonstrated (McClure et al., 1999). Under these circumstances, it may be necessary to employ legislative approaches (although the very existence of these factors can make compliance less likely unless linked to other rewards (e.g., reduced insurance premiums)). These principles also apply with cultures and ethnic groups that have a more fatalistic orientation (Perry et al., 1981).

While fire agencies have comprehensive and relatively objective understanding of the diverse range of factors that influence bushfire causation and behaviour, as well as the complex and contingent relationships between them, ordinary people tend to have much less

sophisticated understanding. The importance of acknowledging this distinction rests with the important contribution made by the richness of this understanding to decisions to prepare. Before proceeding to discuss this, it is pertinent to consider how people interpret the causes of bushfires and their consequences.

Interpreting the Causes of Bushfires and their Consequences

The causes of bushfires are more likely to be attributed to other people and nature or the natural environment than to personal actions (McGee & Russell, 2003). Similar findings were noted by Fried et al. (1999) and are consistent with beliefs that bushfire is uncontrollable and that suppression activities are futile (Winter & Fried, 2000). With regard to how people perceive the cause of bushfires, interesting insights can be gleaned from Kumagai et al's. (2004) comparison of people living in areas at risk from bushfire that had not experienced a fires, those that had, but over three years ago, and those with recent experience. The results are illustrated in Table 1.

	No Experience	**Experience > 3 years ago**	**Recent Experience**
Other's actions	47	57	36
Nature	40	30	49
My Actions	14	12	15

Table 1: The relative distribution of beliefs regarding the source of bushfire causation. It covers those with no bushfire experience (but who live in a high risk area); those who had experienced fire three or more years ago; and those with recent bushfire experience (Kumagai et al., 2004).

Importantly, Kumagai et al (2004) found that, irrespective of their experience, people tended not to consider their own actions as a significant influence. This position was maintained amongst those who had recent, first-hand experience of bushfires and their

devastating consequences. Kumagai et al concluded that when people lost their sense of control, they tended to attribute bushfire damage to the actions of emergency services, even when presented with evidence to the contrary. They argue that when people cannot exercise primary control over their situation, they seek secondary control. Extinguishing fires and protecting their property themselves would have constituted primary control; obtaining fire information or knowing that firefighters were protecting them would have constituted secondary control. Of the two, the latter appears to be the more common outcome. Those who could do neither attributed the cause of the damage they sustained to the emergency services. Where firefighters were observed to be protecting their land, residents were more likely to subsequently attribute the cause of bushfires to nature. The exception to this appears to be long term residents (whose experience of bushfires extends over several decades) (McGee & Russell, 2003). The interpretation of these data must, however, be tempered by the fact that, in McGee & Russell's work, more than half of the sample were also members of the local volunteer fire brigade whose knowledge of fire causation and behaviour may not be representative of the community at large. The issue here is, following Kumagai et al's (2004) findings, is how to encourage primary control beliefs and capabilities.

A failure to develop primary control beliefs can arise when people's mental models of hazards and their behaviour lacks the sophistication to allow them to readily understand why certain personal actions can be effective (Bostrom et al., 1992; McClure et al., 1999). Expert bushfire models might include, for example, fuel type and load, topography, meteorological conditions, as well as how complex interactions between these factors, determines the range of outcomes possible. These sophisticated mental models guide their decisions about how best to mitigate these consequences. Ordinary people, in contrast, typically have relatively simple models of bushfires. As a result, they are less aware of factors that can moderate the damaging effects of bushfires, and therefore see the outcomes as less controllable. There is a

growing body of evidence that suggests that preparation is directly linked to the level of sophistication in people's mental models of hazards and their actions.

Knowledge of Hazard Characteristics and Behaviour

Research on the relationship between peoples' earthquake knowledge and outcome perceptions revealed that the complexity of people's models of earthquakes was positively related to their judgment that damage could be prevented (McClure et al., 1999). People with simple models of earthquakes believed that devastation was inevitable. In contrast, people with complex models believed that damage could have been 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 judgements of preventability. They found that participants with high earthquake knowledge were more prepared for earthquakes. McClure et al. (1999) also observed that when each item in an earthquake knowledge scale was explained to participants, specifically explaining why each action would reduce earthquake damage, people judged earthquake damage to be more preventable than they did prior to the study. This finding shows that information that specifically demonstrates why actions are effective can enhance people's views that damage can be prevented and increase the likelihood of their adopting preparedness actions.

Risk communication programs can facilitate preparedness by explicitly illustrating and explaining 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 design and construction). There is evidence that similar processes influence bushfire preparedness (Kneeshaw et al., 2004; Kumagai et al., 2004). However, even though people may understand and accept the effectiveness of a mitigation measure, their decision to act may be moderated by their perception of the costs and benefits of these actions.

Costs and benefits of interventions

People may not prepare for a given risk such as bushfire because they are aware of many different risks and at the same time are constantly being enticed to expend their resources on other risks, as well as on more attractive activities. Faced with competing alternatives, decisions making will include a degree of cost-benefit analysis. Thus strategies designed to get people to take action in relation to a particular risk such as bushfire need to show why this particular risk is as worthy or more worthy of people's time and resources than the many other risks and attractions that compete for their attention (particularly when communication occurs during quiescent periods when fire may be furthest from people's minds, competition with holiday plans etc). Once this is done, risk communication must attend to the task of encouraging the adoption of each recommended action.

Thus the costs and benefits of preparedness for any risk involve perceptions of the hazard as well as the perceived efficacy of the actions proposed to manage risk. Outcome expectancy is influenced not just by beliefs regarding the effectiveness of an action, but also by people's estimates of the cost-benefit ratios associated with the recommended actions. Paton & Bürgelt (2005) found that households were less likely to adopt bushfire preparedness measures when there was disagreement amongst household members regarding the costs and benefits of such actions. This is an important issue. It means that even if people perceive that a measure can reduce risk, they may still not implement it if they believe that the costs of its implementation exceed the expected benefits from its implementation. The latter could arise for several reasons. For example, it could reflect financial considerations, time commitments, concerns about having to work with others, or reflect perceptions of the probability of an event occurring. On the other hand, recent work suggests that people who see immediate benefit from their actions are more likely to act (Paton, 2006).

In the context of natural hazards, cost-benefit analysis is often referred to as a risk-benefit analysis (Slovic, Fischhoff & Lichtenstein, 2000). A limitation with citizens' cost-benefit analyses is the presumption that people can accurately calculate probabilities and can recognise all the costs and benefits relevant to a particular hazard. In addition, a person's attempt to judge the costs and benefits of bushfire preparation may be biased by the perception that the probability of a large bushfire in their specific area is essentially nil (i.e., costs are high and immediate, but the benefits are low if the measure may not be needed until some time in the future – see above discussion regarding the interpretation of frequency of occurrence information).

In targeting bushfire preparedness in terms of risks and benefits, it is important to counter the perception that only major expenditures are useful in mitigating loss and damage. People more readily undertake actions that are useful for multiple risks, particularly survival actions such as having a torch, radio or emergency kit (Paton et al., 2005). In other words, they see the benefits for this type of multi-purpose action relative to the cost. Amongst those who are more reluctant to prepare for bushfires, risk communication could exploit this feature of cost/benefit judgments to encourage people to at least adopt these items.

This approach is consistent with suggestions that preparation can be encouraged by getting households to first adopt the cheapest or most generally useful protective actions and then building on people's decisions to do so by informing them of the relative merits of other, more costly (time, money etc) actions (Lindell & Perry, 2000). If this strategy is adopted, it is essential that it be accompanied by the provision of specific explanations why additional measures are required and why they are effective (see above discussion on hazard models). This progressive approach may be more effective than presenting household with an extensive inventory of protective actions. Faced with a complex list, people may feel more threatened, resulting in their responding by denying or transferring risk to others.

In the context of the interpretive processes outlined above, the latter approach is more likely to overwhelm people or lead to the recommendations being discounted (particularly as the time, collaborative or financial commitment may lead to costs outweighing benefits). According to this approach, risk communication based on estimating the cost/benefit ratio might first target those actions with potentially greater benefits relative to cost, and progressively building people's inventory of protective measures. This strategy allows the risk communication process to present cost benefit information at the same time as explaining the rationale for the measures it recommends. At the same time, it reduces the likelihood that people not preparing if they see issues as non-urgent, particularly when they are presented with a list of protective measures the reasons for whose recommendation may not be entirely clear. This issue highlights the need for risk communication to adopt a long-term approach, provides a reminder that risk management is an iterative process, and reiterates the need for it to be based on community engagement.

Another related issue concerns how the framing of costs and benefits affects risk judgments. Research suggests that messages that frame outcomes in negative terms may be more effective. For example, research suggests that a negatively framed message (e.g., if you do not prepare, your house is more likely to be destroyed) may be more effective than positively framed messages (if you do prepare, you may increase your family's safety). Research has shown this framing effect with preparedness for earthquakes, in that messages that spelt out the negative effects of not preparing led to stronger intentions to prepare than messages that spelt out the positive effects of being prepared (White, McClure & Sibley, 2006). It is assumed that this reflects an evolutionary sensitivity to negative messages that enhance survival through learning what to avoid (Tversky & Kahneman, 1981). However, other work suggests that positive expectations can be more influential (Paton, 2006). Taken together, these findings suggest that an effective strategy may be to devalue the perceived

advantages of risky behaviours (e.g., not preparing) on cost groups while promoting the benefits of more desirable ones (e.g., facilitating beliefs that measures can increase family safety for more regularly occurring emergencies such as house fires, increasing the value of property by adopting structural measures (Paton, 2006)).

Cost-benefit issues can also extend to the manner in which people perceive their relationship with their immediate environment (Paton & Bürgelt, 2005). They found that lifestyle choices and environmental attitudes also influenced support for some bushfire preparedness and mitigation measures but not others. They were generally happy to support protective measures that do not harm the environment (e.g., keeping their gardens clear of leaves and mowing the lawn) because it does not place them in a dilemma between their love of nature and preparing. However, irrespective of their general attitudes to safety, the costs associated with mitigation measures that adversely affect their natural environment (e.g. controlled burning, felling eucalyptus trees) that makes an important contribution to their sense of place, resulting in the cost-benefit ratio being heavily biased towards costs. They perceive that such mitigation measures damages the flora and fauna in their living environment and thus destroys the very advantages that made them chose to live in or near the bush.

Media Influences on Outcome Expectancy

Risk communication is founded on the premise that it encourages people to choose to prepare. To make these choices, people need information. Information is available, to civic agencies and citizens alike, from the media. In many cases, the media are the more active source, particularly when it comes to reporting response and recovery efforts. How bushfire issues are reported in the media can exercise a significant influence on peoples' perceptions of hazard characteristics, their consequences and how they should be managed (Hughes &

White, 2006). This confers upon the media a substantial capability to influence peoples' future actions. The importance of the media can also be attributed to the fact that it often delivers information that is filtered, processed and interpreted to varying extents and with varying degrees of accuracy.

Given the inherent complexity of bushfire hazards and the number of contingent influences that determine the nature of any given fire event, not all those who receive the filtered and processed media accounts will be able to weave their way through the maze of issues required to construct an objective view of these matters (see above discussion of how the sophistication of fire models influences decision making). Thus, how the media treat the complexity and uncertainty that is an implicit characteristic of bushfires can influence both adaptive capacity and trust in formal sources of information, advice and recommendations (e.g., civic and scientific agencies). As a result, the media can exercise a powerful influence on the debate that occurs regarding the causes and mitigation of hazard consequences. Media coverage can also influence public perceptions of agencies with a civic responsibility for managing hazards.

Media coverage exercises an additional influence on public perceptions of bushfires and their consequences as a result of their tendency to focus on accentuating the magnitude and severity of damage. This tends to reinforce peoples' belief that personal action is likely to be ineffective in the face of such catastrophic events (Gaddy & Tanjong, 1987; Hilton, Mathes, & Trabasso, 1992; Hiroi, Mikami, & Miyata, 1985; Keinan, Sadeh & Rosen, 2003; Lopes, 1992; McClure et al., 2001), reducing outcome expectancy and the likelihood that people will prepare.

Media could play a more positive and complementary role in the risk communication process by reporting how activities that people have undertaken (e.g., how creating a defensible space around a property reduced risk) or building attributes (e.g., roof design)

reduce risk. Cowan et al. (2002) compared news reports written immediately after the 1995 Kobe earthquake with articles written a year later ("anniversary" articles). Those 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.

It is evident from this work that the "generalized damage" information conveyed by news media can increase fatalism and lead people to attribute earthquake damage to uncontrollable causes. Similar processes are likely to prevail for bushfires. However, fatalism can be reduced if news media show that damage is distinctive, and if they portray scenes where homes remain intact because of the protective actions that people have undertaken and/or their good construction. Reports like the "anniversary" articles could be included in risk communication 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 that levels of damage and loss are a function of the interaction between choices people can make (e.g., creating a defensible space, building design) and hazard activity (e.g., minimising the fuel that the fire can feed on, reducing the likelihood of sparks igniting the building).

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. Getting people accept the effectiveness and benefits associated with mitigation and protective measures is an important risk communication goal. However, ensuring that they act on these beliefs is also a function of whether they believe that they can implement them.

Personal Competencies

If people confer upon the proposed protective measures a capacity to reduce risk, whether they progress to forming intentions to act is a function of their beliefs in their competence to adopt and/or implement them. Factors implicated in informing this role include coping style and self-efficacy judgements (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 behaviours, is strongly dependent on one's self-efficacy judgements (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 a factor that was introduced earlier in the discussion of the relative influence of beliefs regarding

when the next hazard event would occur versus likelihood information as predictors of preparing.

CONVERTING INTENTION TO PREPAREDNESS

The formation of intention to adopt protective measures does not guarantee their conversion into action. In a study of earthquake preparedness, Paton et al. (2005) found that the likelihood of preparing was higher amongst those who believed that the next damaging hazard impact would occur within 12 months, and drops rapidly in those who anticipated it not occurring for several years (which reflected their interpretation of likelihood information that described the earthquake as a 'fifty year' event).

The importance of understanding this relationship 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% of respondents believed that a damaging earthquake could occur within the next 12 months, and Gregg et al, (2004) found that only 5% 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' messages (Lindell & Perry, 2000; Paton et al., 2005).

SOCIAL CONTEXT: ITS INFLUENCE ON PREPARING FOR BUSHFIRE HAZARDS

Research has shown that a key predictor of hazard preparedness (and other strategies) is involvement in community networks (e.g., Heller et al., 2005; McGee & Russell, 2003; Paton, 2003; Paton & Bishop, 1996; Turner et al., 1986). People who are active in informal community and neighbourhood networks are significantly more likely to prepare for hazards.

While community characteristics and their implications for preparing are coming under increased scrutiny, less attention has been directed to considering how fire and civic agencies make active contributions to this context and, indeed, play in integral role in this context. As such, they can influence preparation decisions in ways that extend beyond their being sources of information. The relationship between communities and the societal institutions responsible for risk communication are significant components of the social context in which risk beliefs are constructed and enacted. This relationship has a direct influence on risk acceptance, accepting responsibility, and the quality of the relationship that exists with risk communication agencies.

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 underpin community members' trust in civic sources and the likelihood that people will act on the information received (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 taking responsibility for their own safety and to trust the source of information (see also Vogt et al., 2005). By involving community members in decision making about risk and risk management, people were less inclined to want to 'scapegoat' those responsible for emergency planning and risk communication. This appeared to be due to greater community knowledge of the trade-offs involved in creating safer environments (see above discussion of the relationship between hazard models and preparing). Thus, levels of trust, satisfaction with risk communication, risk acceptance, and collective commitment to confront hazard consequences are increased by community engagement based on procedural justice principles (Jakes et al., 2003; Paton, 2005).

This discussion reiterates the fact that the social context influences the beliefs and attitudes that determine the likelihood of adopting protective actions, and highlights the importance of affording it a prominent role when conceptualising and delivering risk communication. When social context is taken into account, it is evident that the effectiveness of risk communication is a function of the level of community engagement and not just about the provision of information.

The importance of this level of analysis is heightened by the fact that it brings the role of agencies responsible for designing and delivering risk communication messages more directly into the risk management equation. While often seeing their role as being that of an objective observer and provider of expert information whose role is relatively independent of those to whom they disseminate information, it is becoming increasingly evident that fire and civic emergency management agencies are an integral component of the risk management process. In the next section, the relationship between risk management and the social context is discussed in a way that encompasses the role of fire and emergency management agencies in the risk management process.

Discussion is built around an empirically validated model of how social trust links communities and fire/emergency management agencies within the fabric of risk management process. This approach can provide fire and other civic agencies with a systematic, evidence-based approach to assessing communities and designing community engagement strategies.

This approach has two general functions. First, it provides a systematic basis for organising the discussion in a way that illustrates how the different factors relate to one another and to the goal of encouraging people to prepare for bushfires. Second, the model describes a set of evidence-based guidelines or predictors that identifies a set of engagement factors that the risk communication process can target. The model is based around the pivotal

role that social trust, a prominent predictor of bushfire preparedness (McGee & Russell, 2003; Vogt et al., 2005) plays in the risk communication process.

Social Trust and Risk Communication for Natural Hazards

Trust is a prominent determinant of the effectiveness of interpersonal relationships, group processes and societal relationships. Trust only becomes necessary when there is some potential or actual risk to the decision maker (Coleman, 1990). When dealing with bushfires, all decision makers have to deal with risk and uncertainty. That trust functions to reduce the uncertainty and complexity that people encounter when faced with novel events (Siegrist & Cvetkovich, 2000) elevates its status as a construct of considerable importance when dealing with unfamiliar, infrequent and complex environmental hazards like bushfires (Kumagai et al., 2004; McGee & Russell, 2003; Vogt et al., 2005; Winter, Vogt, & McCaffrey, 2004).

Vogt et al provide a good illustration of the importance of trust. They report how ill-feeling about a controlled burn that escaped and caused considerable damage remained a source of contention and mistrust that continued to undermine trust in fire agencies some 20 years after the event. This anecdote highlights the importance of including social trust in a model of bushfire preparedness. If trust is lost, it may take years or decades to re-build it. If it is lost, this can have significant ramifications for the quality of the risk communication process that takes place between fire agencies and communities (Kumagai et al., 2004; Paton et al., 2001).

Trust can also be undermined by the inferences people make regarding the motivations of those providing information (Earle, 2004; Kee & Knox, 1970). Johnstone et al. (2005) found that trust declined when residents attributed the perceived inadequacies in information about tsunami risk to civic agencies putting economic factors ahead of community welfare. That is, they believed that information was being withheld in order to minimise the risk of hazard information adversely affecting economic and real estate activity. 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 in civic emergency management agencies can also be undermined by citizens' beliefs that expenditure on hazard mitigation by civic agencies is unnecessary (Paton et al., 2001). In this case, this was due to people not believing that the need for mitigation was evenly distributed amongst all those that were required to pay for it. Consequently, the uneven distribution of costs and benefits (see above) led to a loss of trust in the civic agency responsible for risk management.

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. Inconsistency reduces the credibility of risk information, dilutes its ability to assist decision making, and reduces levels of future trust in the sources of (conflicting) information (Kee & Knox, 1970; Poortinga & Pidgeon, 2004; Siegrist & Cvetkovich, 2000).

Trust influences perception of other's motives, their competence and the credibility of the information they provide (Earle, 2004; Kee & Knox, 1970; McAllister, 1995). As such, trust would be expected to play a prominent role in mediating relationships concerned with promoting understanding of, as well as action to mitigate, complex, potentially catastrophic, yet infrequently occurring environmental hazards.

People's perception of risk is influenced by social context (Earle, 2004; Poortinga & Pidgeon, 2004). A key issue here concerns understanding how people construct their risk perception both independently of and in concert with formal sources of risk information. For example, Kumagai et al. (2004) noted that pre-exiting beliefs regarding bushfires being

caused by natural forces or other people overrode the benefit of formal and factual information regarding mitigation.

This work highlights the need to develop an understanding of the mechanisms that account for the social construction of risk. Armed with this knowledge, fire agencies will be better placed to design risk communication programs that can dovetail with the processes occurring naturally within a community. Discussion focuses here on how trust plays a pivotal role in mediating the relationship between community characteristics that influence people's capacity to confront the uncertainty associated with complex, infrequently-occurring natural hazards and preparedness.

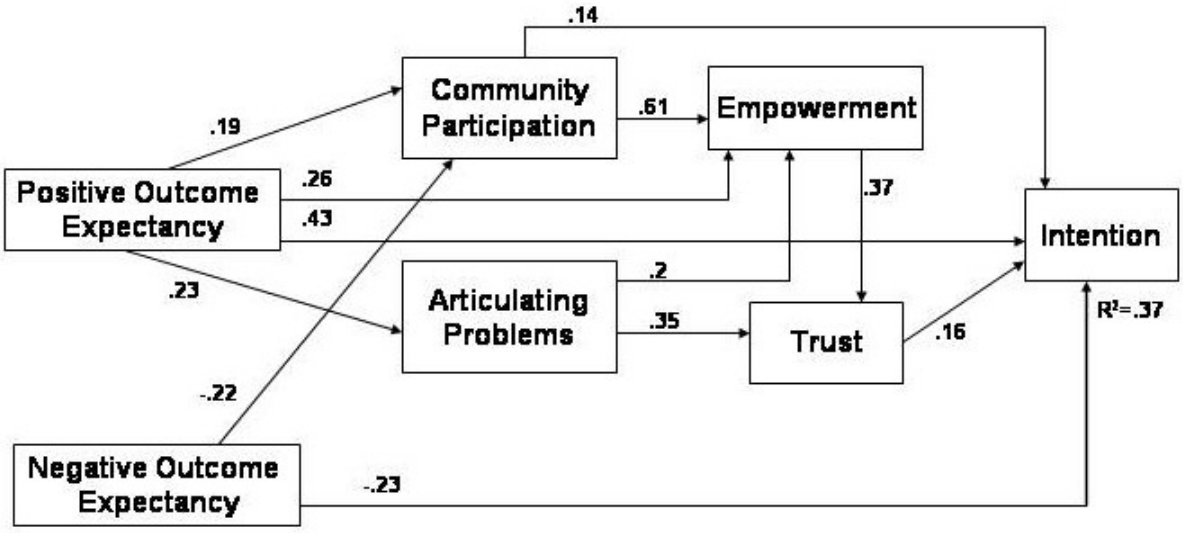

Figure 2: The relationship between outcome expectancy, community characteristics, trust and intention to prepare for nature hazard consequences. The arrows illustrate the relationships between the components. The numbers adjacent to each line illustrate the strength of the relationship (strength of prediction).

The model (Paton, 2006) describes trust as mediating the relationship between personal beliefs (outcome expectancy) and structural factors (e.g., community participation) and preparing (Mayer et al., 1995). Paton (2006) found that outcome expectancy, community participation, collective problem solving interacted with the degree to which community

members believed that emergency management agencies empowered them to act to confront local issues predicted trust and, subsequently, intentions to prepare (intentions were used here because very low levels of actual preparedness preclude using the latter for model testing). McGee and Russell (2003) also noted that a capacity for collective problem solving influenced preparedness.

While not examining the specific influence of trust, similar structural factors were observed to be influential by Jakes et al. (2003). They found links between preparedness and social capital (community characteristics contributing to collective social action such as leadership, networks and mobilization of resources), human capital (the knowledge and skills an individual attains through education and training) and cultural capital (knowledge and skills people possess through their heritage, experience, and place attachment). They also identified agency involvement as a fourth element in this process (which corresponds to some extent to empowerment). The model is depicted in Figure 2.

Outcome Expectancy

Outcome expectancy, how people assess the perceived effectiveness of mitigation measures and costs and benefits associated with them, influences both trust and preparing (Coleman, 1990; Kee & Knox, 1970; Paton et al., 2005; in press; Scott, 1980; Yates & Stone, 1992). Two outcome expectancy variables are included in the model. Positive outcome expectancy taps into beliefs that personal preparation can make a difference and add value to one's life (benefit > cost). Negative outcomes expectancy taps into beliefs that hazards are too destructive for personal action to make a difference (cost > benefit).

The relationship between negative outcome expectancy (which assesses peoples' beliefs that hazard consequences are so destructive or catastrophic as to render any personal actions futile) and participation, is consistent with the view that trust is less important when the

perceived benefits of action are low. If people hold this belief, issues of trust are rendered redundant, with people being more likely to discount or ignore messages rather than taking them on board and evaluating their implications (Figure 2). This is evident in the negative relationship between it and intention to prepare and its role in reducing the likelihood that that hazard issues will become a topic of discussion in community groups.

However, when people hold positive outcome expectancies (i.e., they believe the general benefits of preparing for natural hazards outweigh the costs and perceive the desired outcomes as achievable), the search for information becomes a more salient activity. In addition, to its expected direct influence on intention to prepare, positive outcome expectancy also predicted both community participation and articulating problems.

Community Participation

Peoples' concept of environmental risk is influenced by others' views, as are the choices they make regarding its mitigation (Earle, 2004; Jakes et al., 2003; Lion et al., 2004; Poortinga & Pidgeon, 2004). A role for community participation in predicting preparedness has been identified in studies of bushfire preparedness (McGee & Russell, 2003) and other hazards (Tierney et al., 2006).

The benefits of participation may include acquiring new information from discussions with people, learning new skills, being involved with important issues, making interpersonal contacts, personal recognition, and a sense of improving the community by contributing to improving their own and others' quality of life (Dalton et al., 2007; Earle, 2004). Consequently, people must have access to social contexts within which discourse about any issue can take place. Importantly, because it involves tapping into social activities that people elect to undertake, community participation ensures that any discussion will occur in a social context whose characteristics will be consistent with

participants' norms, values and expectations (Eng & Parker, 1994; Heller et al., 2005; Jakes et al., 2003; Paton, 2006). It represents the social context in which peoples' models of risk are developed and sustained, their uncertainties confirmed or resolved, and their information needs given form in a manner consistent with their needs and expectations. It can influence intentions directly, or indirectly when its action is mediated by empowerment.

Hazard education programs rarely require active and sustained community participation as a component in programs intended to encourage preparing. However, given a role for social interaction in forging peoples' concept of environmental risk, integrating hazard education with other community activities could, by increasing opportunities for discussion of hazard issues, be beneficial (Earle, 2004; Paton, 2006). The fact that participation is important but not sufficient to provide a context for evaluating information was evident. Community members also need to direct their participatory endeavours in ways that facilitate their ability to identify what they need to know.

Community problem solving

When dealing with complex and uncertain environmental events, a capacity to formulate questions consistent with the community member's values, needs and expectations will influence their ability to appraise and evaluate information and, therefore, determine whether or not information acts as a catalyst for action (Earle, 2004; Eng & Parker, 1994; Jakes et al., 2003; Paton, 2006; Paton et al., 2005). A resilient community is one that has a capacity to articulate salient problems or issues and to formulate these into questions that facilitate their receiving the information and resources they need to confront the issue themselves.

One way in which this can be achieved is by defining the problem for which they seek information. It is the consistency between the expectations formed through problem definition and the information received that helps people reduce uncertainty (Earle, 2004; Paton et al., 2006) and influences trust. A key competence in this context is id defined by the quality of collective problem solving capability in a community (Eng & Parker, 1994; Jakes et al., 2003; McGee & Russell, 2003) will be influential.

Given a need to seek this information from formal sources, a link between articulating problems and trust would be expected. That is, as the capacity to formulate problems and pertinent questions increases, the more likely people are to be able to direct their information search. This increases the likelihood that people can evaluate whether the information they received is consistent with their expectations and thus capable of reducing uncertainty and contributing to understanding and goal attainment. If the latter is achieved, trust in the source of information will increase (Siegrist & Cvetkovich, 2000).

Hazard education programs rarely require community members to actively engage in problem solving activities to determine a course of action appropriate for them. Indeed, this is often the subject of criticism of risk communication programs (Paton et al., 2006). This finding highlights the benefits that could accrue when risk management programs facilitate active community problem solving activities (e.g., facilitating their ability to work out how to mitigate hazards in ways consistent with local needs such as reconciling economic activity with hazard mitigation). This work also introduces the need to see risk management as a long term, iterative process in which capacities are developed and sustained over time.

The opposite is also true. In the absence of a capacity to formulate questions (in a context of uncertainty), and thus information needs, the more difficult it will be for

people to identify, seek, and evaluate information in ways that act to clarify the uncertainty they face. Because people tend to attribute failure to external sources (the actor-observer effect associated with fundamental attribution error) rather than to a lack of ability on their part, their level of trust in that source will diminish as a consequence. This relationship has been found for volcanic (Paton, 2006) and bushfire hazards (McGee& Russell, 2003; Kaumagai et al., 2004). It is thus important that fire agencies assess levels of this competence prior to embarking on an engagement strategy.

With regard to the quality of this problem-solving process, Eng and Parker (1994) argue that it is also characterized by the degree to which reciprocal feedback between the parties facilitates goal attainment. In so doing, Eng and Parker suggest that realizing the benefits of collective problem-solving competence requires that societal institutions act in ways that empower community members and provide the resources, including information, required to act on issues deemed salient by a community.

Empowerment

Empowerment describes peoples' evaluation of the degree to which they perceive that their experience with a source of information has facilitated their ability to achieve their needs and goals in the past (Earle, 2004; Paton & Bishop, 1996). This approach is consistent with views that peoples' past experience guides their construction of their positive expectations of the intentions and behaviours of others (Earle, 2004).

Empowerment describes citizens' capacity to gain mastery over their affairs and confront environmental issues while being supported in this regard by external sources rather than being led by them or having solutions thrust upon them. Empowerment strategies are driven by the goal of promoting the equitable distribution of resources (material, social, knowledge,

peer helping, belongingness) to facilitate social justice, sense of community, and the development of a collective capacity to confront local issues, whether of a hazardous nature or not (Eng & Parker, 1994; Paton & Bishop, 1996).

Empowerment thus reflects the quality of reciprocal relationships (social justice) between community members and between community members and societal institutions (Eng & Parker, 1994; Paton & Bishop, 1996). The quality of these relationships will define the degree to which responsibility is devolved to community members. The more citizens perceive their needs as having been met through their relationship with civic institutions, the more likely they are to trust them and the information they provide and use it to formulate and act on plans to mitigate risk. This prediction was supported (figure 2).

This work supports the utility of the proposed model as a means of understanding how social trust influences risk communication about natural hazards. Trust in civic institutions plays a significant role in peoples' decision making regarding adoption of protective measures.

Risk communication is not just about providing information. The social construction of risk and its management must be considered, and future research should encompass both the information made available and the community and societal contexts within which it is disseminated. Currently, risk communication programs rarely include strategies that encourage discourse about natural hazards or that facilitate citizens' active involvement in developing and implementing sustained mitigation practices. The benefits that can accrue from this work are evident from positive feedback about it when included in programs such as Community Fireguard (McGee & Russell, 2003). However, the latter authors suggest caution in assuming that the benefits noted in rural populations will automatically apply to those in the

peri-urban fringe, or even to those who migrate for lifestyle reasons to rural areas. The reason for their caution stems from observations that the effectiveness of risk management programs relied on the presence of strong, pre-existing social networks that may not be present in the other contexts (McGee & Russell, 2003).

This work reiterate the need for risk communication to be based on community engagement principles (Paton, 2005) and encourage discussion of hazard issues within established community forums (e.g., religious groups, social action groups) in ways that empower community members to identify the implications of hazard activity for them and facilitate their ability to confront those issues (Paton, 2006; Paton & Bishop, 1996). When emergency management agencies engage community members about hazards, levels of trust, satisfaction with communication, risk acceptance, willingness to take responsibility for their own safety, and collective commitment to confront hazard consequences will increase.

One approach to achieving this would involve fire and other civic emergency planners assimilating and co-ordinating the needs and perspectives derived from community consultation, and providing the information and resources necessary to empower community groups and sustain self-reliance and resilience. Emergency management agencies would 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 (Paton, 2000). This approach can help embed the processes by which adaptive capacity is developed into the fabric of community life.

RISK COMMUNICATION AND CHILDREN

The majority of the research on risk perception and risk communication has involved adult populations. As a result, it may not be directly applicable to children. The importance of

developing specific understanding of risk perception in children and adolescents can be traced to the fact that the recent National Inquiry on Bushfire Mitigation and Management (Ellis, Kanowski, and Whelan, 2004) recognised a need for the development and dissemination of risk communication aimed at educating communities about bushfire risk and mitigation and increasing levels of preparedness in susceptible areas. Schools were identified as a major resource for pursuing this objective. However, in order to utilise this resource effectively, and ensure that risk communication delivered in this context is designed to meet the needs of this demographic group, it is necessary to understand how children construct bushfire risk and act on the risk information made available to them.

There are two significant issues that must be taken into account when pursuing this objective. The first relates to the fact that risk perception is socially constructed (Joffe, 2003). The second concerns the fact that children's understanding of important constructs such as causality and prevention change systematically and becomes more sophisticated with age (Paton & Brown, 1991). The final section of this review is devoted to providing a summary of work planned (by Briony Towers) within Program C4. This project will develop a theoretical model of bushfire risk perception that integrates these perspectives.

As outlined above, risk perceptions evolve through social interaction. Studying risk perception within the social context in which it develops and is enacted will provide more comprehensive insights into how risk is constructed and how risk perception influences acting on risk information. Joffe's (2003) Social Representation of Risk theory, which will be used to provide the theoretical foundation for the study, complements socio-cultural theories of child and adolescent development. These theories focus on the social context as the unit of analysis, with cognitive development being conceived as a process whereby the skills and knowledge of the culture are internalised through social interaction involving a sharing of focus, purpose, and understanding (Bruner, 1977; Rogoff, 1990; Vygotsky, 1978; Wertsch,

1985). Taken together, the SRT of Risk and socio-cultural theories of developmental provide a theoretical framework within which to examine children's construction of bushfire risk.

For this project, three elements of the social context have been selected for study: the school, the family, and the peer group. These elements have been selected because there is an extensive literature implicating them in children's conceptual development in a wide variety of knowledge domains (Case, 1992). In addition, they are common amongst children across contemporary Australian communities. An important consideration in this analysis, however, is that the relative influence of each element of social context is not static but changes as children move from early childhood through to adolescence. For example, in early adolescence, an increase in the influence of the peer group is accompanied by a decrease in the influence of the family (Rubins, Bukowski, & Parker, 1996). Unless the dynamic nature of these relationships is taken into account, it will not be possible to conduct comprehensive models of risk perception. Thus, it is necessary to identify the influence of each element at each developmental stage. Furthermore, family influences are not necessarily unidirectional (Bronfenbrenner, 1979) and it is possible that children may influence their parents understanding of bushfire risk and mitigation and vice versa (see also the above discussion on critical awareness).

A useful framework within which to examine cognitive constraints on children's understanding of bushfire risk and mitigation is provided by Piaget's (1954) theory of cognitive development. The basic tenet of Piagetian theory is that development progresses through four consecutive stages: the sensory motor stage (0-2yrs); the preoperational stage (2-7yrs); the concrete operational stage (7-11yrs); and the formal operational stage (12-adult), each with its own implications for how children interpret the world. Piaget hypothesised that progression from one stage to the next results in a qualitative shift in perspective and that this shift is due to a reorganisation of the psychological capacities for logical thinking. Whilst

Piaget's theory of cognitive development has been criticised (e.g.Gellman & Baillargeon, 1983), the assumption that conceptual understanding undergoes qualitative shifts throughout childhood and adolescence remains relatively intact in several contemporary theories of cognitive development (Feldman, 2004).

The overall aim of this work will be to identify the role of the social context in the construction of bushfire risk at each developmental stage, identify the cognitive constraints on the construction of bushfire risk each developmental stage, and integrate these perspectives to develop a comprehensive, theoretically robust, socio-cognitive model explaining the construction of bushfire risk over the lifespan. This model will provide fire and other emergency management agencies responsible for educating communities about bushfire risk and mitigation with a framework within which to design more effective risk communication programs that accommodate and capitalise on existing social resources and cognitive capabilities. Importantly, it will provide a set of systematic guidelines for the development of age-appropriate risk communication programs. The utility of this approach has been consistently demonstrated in research on health-related risk communication (Paton & Brown, 1991; Shute & Paton, 1990) and road safety education (Tolmie et.al, 2005), with research in both areas providing evidence that when content is designed to accommodate cognitive constraints and the mode of delivery is sensitive to prevailing influences within the social context, children are able to develop more sophisticated concepts of risk and the ways in which it can be managed.

CONCLUSION

Encouraging households and communities to adopt measures to mitigate bushfire risk and to prepare to manage bushfire hazard consequences has been identified as a significant social policy objective. While strategies based on the provision of information to the public have

dominated risk communication, this approach has failed to promote the sustained adoption of preparedness measures. Whether or not people prepare thus involves more than just making information on the likelihood of fire occurring, bushfire hazards, and mitigation measures available to them. Rather, it involves understanding that decisions to prepare or not involves a complex set of reasoning process that people use to make a series of decisions as they negotiate the relationship between them, environmental hazards, the sources of risk information, 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 risk management strategies designed to encourage the sustained adoption of mitigation and preparedness measures.

Given the sequential nature of the preparedness process, the effectiveness of intervention will be enhanced by using the models described in this report to identify the 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 people use the information available to them, in the social in which they interact, to 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. Some will involve the provision of information. Others will require more active engagement with communities and the facilitation of household and community activities. 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 and involve working with community groups to consider how choices that are under their control can affect the outcomes they can experience should a bushfire occur. A different approach would be required to encourage more discussion of hazard issues within a community (Paton, 2006). Similarly, promoting change in core competencies such as self-efficacy and action coping will require involving citizens in activities in which they actively identify and resolve problems in their community. In the final section, the issues discussed above are summarised.

SUMMARY

People make judgements about the information presented to them and actively interpret it within frames of reference that can differ, sometimes substantially, from their scientific and civic counterparts who develop and deliver risk messages. It is not information per se that determines action, but how people interpret it (e.g., render it meaningful) 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 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 fire and civic agencies. Hence, to facilitate the adoption of protective measures, it is important to understand how people interpret information about hazards and make decisions about how they will deal with hazard consequences.

Several general theories that focus on increasing behaviours that reduce risk can provide a robust framework within which to develop risk communication programs. These theories emphasize the importance of focusing on specific actions, rather than broad classes of action. They also highlight the value of developing implementation intentions that specify how, when and where protective actions will be carried out. They also argue that risk communication should include strategies that foster problem-focused coping that focus on solving the problem and that facilitate recognition that people have at least some of the resources to deal with a threat.

Bushfires are, in any one area, low frequency events. People tend to underestimate the risk of low frequency events relative to high frequency events, and their lack of action reflects this

bias. This bias can be reduced by giving people a long-term time frame (e.g., indicating their risk from a bushfire over a period of decades).

Whether people's prepare or not is influenced by whether they base their judgments on bushfire likelihood or on the consequences of bushfire hazard activity. Bushfire preparation does not relate to bushfire likelihood, but it does relate to the perception that a bushfire is likely to have significant consequences for oneself. Risk communication messages should focus on the likely consequences of a bushfire rather than the likelihood of it occurring.

Problems can also be traced to people's tendency to misjudge the relative risk of different hazards. People's subjective estimates of the relative risk from different hazards often differs from objective risk estimates; they then expend resources on actions in relation to other risks (e.g.. burglary) and not bushfire preparedness. Public information can inform people of the relative risks and costs associated with bushfires as opposed to other risks.

Hazard-related anxiety reduces the likelihood that people will prepare for bushfires. It often does so by encouraging denial of the problem. A similar outcome can arise as a result of people denying their vulnerability, and is greater where people have a higher risk. Denial is reduced when people gain more control over the hazard (e.g., by preparing), or when they learn that they have some control over the hazard and can reduce their vulnerability through their own actions.

While accepting risk is fundamental to people acting to reduce risk, several social-cognitive biases can interfere with this process. For example, unrealistic optimism occurs where people think bad things (e.g., harm from bushfires) will happen to other people and not to themselves

and, as a result, effectively transfer risk to others, reducing the likelihood that they will attend to risk information or prepare. Unrealistic optimism can be countered by awareness of hazards affecting others similar to oneself and by showing people actions that other people have already taken to mitigate the risk.

Preparedness decisions are also influenced by how people perceive the efficacy of the recommended actions. This can reflect the prevailing level of fatalism (locus of control) and/or their beliefs regarding the likely effectiveness of the recommended measures. Fatalistic individuals believe that nothing that they do will make any difference to the consequences they experience in a major bushfire. Fatalism can be reduced by encouraging people to focus on specific instances of harm that can be prevented or prepared for.

It is also important to focus communication on people's beliefs about action versus beliefs about the hazard. Beliefs about preparedness actions are stronger predictors of action than beliefs about the hazard (e.g., how likely a bushfire is). Messages should give primacy to focusing on beliefs about the effectiveness of mitigating actions, rather than bushfire likelihood.

Irrespective of the beliefs that arise regarding the efficacy of mitigation actions, preparedness decisions making is also affected by people's perception of the costs and benefits of interventions. People often judge that preparing for bushfires is not worth the cost in terms of money or time, partly because they do not realise that low cost actions may have major benefits. Messages can communicate that many survival or mitigating actions have a low cost but may have major benefits in terms of reducing vulnerability to the risks from bushfires. If

risk management is planned as a long term strategy, it can build on progressive successes to facilitate the adoption of more and more complex and/or costly measures.

It is also important to ensure that risk communication programs facilitate accurate attributions for bushfire loss and damage. People are often exposed to media images of generalised damage in bushfires, and can reach the conclusion that the damage is solely an outcome of the natural hazard. This judgment can be countered by showing people that damage is selective, and sound practices and structures are much less likely to suffer damage or loss. This message leads people to attribute the damage to building design and actions that people can take and see that damage is preventable. In pursuing this option, it is important to complement it with information and activities that reinforce the importance of personal responsibility and the need for risk management to be a personal responsibility, with emergency services playing a secondary role.

The latter point highlights the role of people's models of bushfire activity and damage. In contract to their professional counterparts, most people have simplistic causal models of the chain of events from a bushfire to eventual outcomes. These simple models correlate with lower preparedness. Communications about bushfires can fill in critical gaps in people's understanding of damage from bushfires, leading to better understanding of the risk and how to address it.

Sensational new reports often give the impression that bushfires produce an indiscriminate devastating effect, and portrayals of devastation increase people's anxiety and their sense of helplessness and inadequacy. Risk communication can be more effective when it provides specific details on how to prepare and when it originates from sources that are trusted, and

when consistent information is repeated. Messages that communicate the role of building design and preparatory actions lead people to attribute the damage in part to the building design and to see that the damage might be prevented or reduced.

The social context plays a significant role in decisions about preparing. Many public education strategies target households in isolation and do not access the potential benefits of informal community networks and strategies based on community engagement. Strategies to increase bushfire preparedness are more effective if they are transmitted and reinforced through informal community networks. Fire and civic agencies responsible for risk communication are not just sources of information. They are also integral players in the social context, with their relationship with the community being linked by levels of social trust. Social trust plays a pivotal role in risk communication. Levels of trust reflect people's beliefs about the effectiveness of the measures recommended, the quality of community relations (e.g., community participation) and community competencies (e.g., problem solving) and the quality of the relationship between the community and the agencies responsible for risk communication (e.g., empowerment). This can be facilitated by fire and civic emergency management agencies assimilating and co-ordinating the needs and perspectives derived from community consultation, and providing the information and resources necessary to empower community groups and sustain self-reliance and resilience. Emergency management agencies should 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. Facilitating community-led discussion of issues, community leadership, and the provision of information into these community fora, risk management strategies are more likely to embed the processes by which adaptive capacity is developed into the fabric of community life.

In the introduction to this report, a need to distinguish between the process of communication and the specific content of the messages or the engagement process was emphasised. The preceding contexts have focused on identifying the content issues that can inform the issues that are communicated about.

With respect to the process of communication and engagement, several reviews identifying the issues that contribute to the effectiveness of this component of risk management are available. Material form two of these (Mileti et al., 2004; National Environmental Protection Council, 1999) is included as appendices to this report. By combining these with the issues outlined in this report, it will be possible to optimise the effectiveness of the risk communication process by ensuring that issues that influence how people make decisions about whether or not to prepare can be addressed.

Separating the process and content issues is important in other respects. Notable here is that fact that, as alluded to in the above report, the factors that influences decisions to prepare hold complex relationships with one another (Figure 1 & 2) and these contingent relationships must be accommodated in the risk management process. In light of the comment made above regarding the need to adapt the process to the appropriate level of analysis (e.g., information dissemination versus engagement; individual versus collective levels of debate), means that no one means of communicating information will always be effective. In keeping with the need for risk management to be an iterative and contingent process, the contents of the appendices should be considered in a similar vein and used as a menu from which appropriate techniques can be selected. Finally, the discussion on issues that affect preparedness identified generic factors. The final issue to be taken from this is that fire and

other civic emergency planning agencies will need to adapt the content to suit the needs of the populations with whom they will be interacting.

The effort expended on accommodating the issues discussed in this report will pay benefits in terms of enhancing preparedness and increasing the return on the investment that society makes in risk management and risk communication. By ensuring that risk management and risk communication strategies are developed and delivered in ways that are consistent with the needs, expectations and capabilities of the recipients the effectiveness of the risk communication will be enhanced and ensure an adequate return on the social investment in this activity. When this happens, estimates of community capability to mitigate, adapt to, deal with and develop from exposure to bushfires will increase substantially, as will confidence in the planning and policies that define societal responsibility and the actions they stimulate preparedness in communities at risk from bushfires.

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Appendix 1

Summary of the "**Laws Of Effective Public Hazard Education**" from:

Mileti, D., Nathe, S., Gori, P., & Lemersal, E. (2004) Public Hazards Communication and Education: The State of the Art. Boulder, CO.: Natural Hazards Research and Applications Information Center, University of Colorado at Boulder.

Summary of the "Laws Of Effective Public Hazard Education" (Mileti et al., 2004):

Be Clear. Complicated phenomena must be clearly explained in non-technical terms. Experts generally can't accomplish this, so hire people that have communication skills to work with experts to craft the words that you'll give to the public.

Use Varied Sources. Information must come from various relevant sources including authorities, technical experts and scientists and engineers (if applicable), and from people familiar to locals. Multiple sources can author the same communication and/or the same communication can come from multiple sources or, better yet, use both approaches.

Render Information Consistent and Repeat It. The information people receive should be consistent, changes from the past should be explained, and repeated frequently through many different media and disseminated through varied networks such as neighbourhood networks, community associations or the media.

Use a Stream of Communications. Messages on TV and radio are effective, but what works best is an information stream of many communications through diverse media and over time that includes a written document, mid-stream, direct mailed to people's homes.

Tell People What to Do. Despite what physical scientists and technical experts think, the most important information that you can give to people is to tell people what they can do before, during, and after an event.

Support People in Their Search for More Information. The first thing that you can count on people doing--if the educational effort is working--is for them to talk it over with others and to seek out more information. Expect it. Encourage it. Support it.

Use Words and Great Graphics. Clear information works best, so use simple language, but support the language with graphics, and present them attractively.

Position Additional Information in the Community. People always search out more information on their own to validate and .confirm. what they've already gotten. So position the kind of additional information that people will look for in the community in the places that people will look for it and tell them where they can find it.

OTHER IMPORTANT THINGS THAT HELP

Partnerships Work Best. Partnerships work better than if only one organization disseminates the information. High-profile organizations in the area with an established track record are important to include in the partnership.

Feature Specialists. Education programs are more effective if they feature specialists who are experts in the area of hazard that your education program is about.

Adapt Material to Locals. The information that you present should be adapted and customized to your constituents. For example, if the population(s) you seek to educate have a disaster in local memory, reference it in your materials; or if there are significant numbers who only read special newspapers, be sure to add those newspapers to you public education campaign to communicate with those people.

Use Different Ways to Communicate. Many good means exist to communicate with a public. Use as many as you can. For example, the grocery bag or mass mailing approaches are a great way to communicate. But they alone are not sufficient. The more numerous and diverse the ways used to communicate with the public, the better. Be innovative in selecting many diverse ways to reach people.

Tailor Information for Special Groups. It is a mistake to assume that any public is homogeneous: public information should be tailored to the different special groups in an area. For example, an effective approach to deliver information and materials for middle-class homeowners will be different from those who might live in a communal farm in the hills above town; and those for schools will not be like those for large corporations.

Use Multiple Languages. Public hazard education efforts that have been conducted in multiple languages have worked better than those that have just used one language.

Use a Good Mix of the Verbal and the Visual. The right mix of verbal and visual ways to communicate with the public works best. Finding the right mix of verbal and visual information about a risk and what the public should think and do about it is not always easy, but it increases the success of public hazards education.

The .Golden Rule.: Use Windows Of Opportunity

Both empirical research and seasoned observation support the golden rule of public education for hazards: *all the sophisticated materials and behavior modification techniques do not have the force of one good disaster to change both what people think, their behavior, and even public policy, at least in the short-term*. During the well-known "window of opportunity" that opens following a disaster, abundant information from various sources in the affected locale will increase the chances for changing what people think and their behavior. This is also the case for people and communities that were not directly impacted by that disaster but, .experienced. it over the media. However, while people are more apt to alter behaviors after a disaster strikes, change after a disaster is most likely when public educators have already worked to make sure the problem is recognized, the solution is known, and some advocates are already in place. Do not wait for the window to open; build a sustained advocacy program beforehand. Not working constantly may result in waiting forever. Take advantage of a window opening someplace else. Use it while you can, for the window is not open long! The fleeting interest wanes. A public policy maker's memory and attention are even shorter than the public's. Typically, even after a big disaster, he or she will not keep that hazard high on the list of big issues for more than two or three months.

Using What's Known to Craft the Ideal Message

The items covered are not in descending order of importance; each is important, although some have greater importance than others.

Use Simple Language. Translate and manipulate information about the hazard in order to make it accessible. Reading in the newspaper the technically sophisticated and generally incomprehensible statements of scientists, engineers, or actuaries will not give most people an elementary understanding of the hazard and likely impacts on their lives. Simple language in manageable amounts is absolutely necessary. Though credentialed spokespersons are one of the most important sources of information, specialists who speak only in the jargon of their discipline will not be effective. Authoritative interpreters of technical information should be cultivated, encouraged, and paid well. Fit the specialist to the topic, for example: scientists should talk about science, engineers and architects should talk about structures, and firefighters and emergency responders should talk about home safety.

Keep the Information Consistent. Since most people are exposed to information through a number of media and from various sources, have your information frequently repeated over diverse communication modes and keep it consistent. Inconsistent information confuses people and allows them to discount some or all of it. Educators should partner and work together, across jurisdictions and organizations, to see that their messages are similar. For example, numerous organizations--state agencies, the Red Cross, school authorities, and media outlets should work together and come up with a common public message.

Package Information for the Media. One of the hallmarks of an effective public education program is plenty of material on hand when the TV and radio stations start calling and the feature writer from the paper shows up looking for the local angle. Prepare media packets that cover the full list of topics the media might be interested in finding out about, use verbal and visual ways to present the information, and say it in clear and understandable language.

Cover Three Critical Topics. The message presented to the public should clearly explain three critical issues: 1) potential losses, 2) the chances that the losses will take place in a certain amount of time, and 3) how to cut the losses. This can be thought of as the tripod on which good hazards public education rests. Without any one of the three legs, an initiative could teeter and ultimately fail.

Describe Potential Losses. Generally, people can't imagine the impact a hazard could have on their community, their house, or their place of work, so they must be assisted by descriptions of the hazard, pictures, scenarios, or computer-based maps. The essence of this task is working to overcome the almost universal human tendencies to conclude that it can't happen here or it won't happen to me. The more relevant the description can be to the situation of the audience, the more likely it is that they will attend to it. A good educator can find "the local angle" in any hazard or disaster--even in a far-off land--and work it.

Discuss the Odds About When the Losses Will Take Place. Once people understand that it could, indeed, happen here, they must be further convinced that it may happen to them: in the next 10 years, the lifetime of their mortgage, or during their watch. Although almost no one but mathematicians and professional gamblers really understands odds, most people will want to know the likelihood of a hazard occurring in their neighbourhood in an uncomplicated sort of way and in a smallish number of years. Probability estimates will not, in themselves,

accomplish much with the public, but the information will assist in creating the uncertainty that is so important to changing people's opinions about a hazard and their behaviour.

Explain How to Cut Losses. A person with a clear picture of his or her possible losses must quickly be offered suggestions and directions for how to reduce them. Without these blueprints, people can fall prey to a fatalistic inertia. Appropriate assistance may take many forms: a how-to video for homeowners; evacuation guidelines for a school; a business resumption planning process for a corporation or a city government; encouragement and help from a neighbourhood emergency response team; or recommended policy changes for a water system. People can be guided to change their opinions and what they do to deal with future risk in endless ways.

Say Who's at Risk. Specify who could be at risk in a future event and who could not for both education and planning purposes. Such information will also help emergency planners anticipate response needs. Beyond physical effects, people should be helped to recognize that they would be economically damaged, socially isolated, psychologically troubled, and just plain inconvenienced. Detail the exact impacts of the disaster on all groups in the community, on utilities, on transportation systems, and on governmental and non-profit organizations responsible for public health and well-being.

Embrace Uncertainty. Be clear about the lack of certainty, if any, in predicting the incidence and effects of a hazard. Any scenario of a future event is a best guess. Overstating or understating the risk or inflating or deflating the probability of a future hazardous event inoculates people against belief just as surely as inconsistency. Predictions of catastrophe strike some people as too extreme to be credible; they terrify others. Neither group will be likely to accept the information as deserving of further questioning or attention. More than one public education project has painted too dire or safe a picture and compromised its credibility.

Using What's Known To Deliver the Message

Public education that works is a complicated process--on both the delivery and receiving ends. Campaigns must be coherent and collaborative, their information must be credible and understandable, and the information must reach its intended audience. In that statement is a prescription for close cooperation among technical specialists and educators, constant

communication among educational organizations, and sophistication and creativity in the message translators and communicators.

Use an Information Stream and Include a Written Brochure. The brochure should explain specifically, what the risk is; where the risk exists geographically and where it does not exist; when the event is likely to happen; what the effects will be; what people should do before, during, and after the event; and where to get additional information. The information in the brochure should be as clear as possible. Probabilities should be supplemented with the certainty provided by stating that the officials and scientists are convinced that the odds of the event happening/not happening are high enough/low enough that they recommend public action/no action. The distribution of a brochure is not enough, however, and it must be supplemented. The public must be primed before the brochure is distributed so that the topic is sufficiently salient for them to keep it when it arrives. This additional information should come from as many different sources and through as many different channels as possible. People who see neighbours, friends, and relatives preparing for the hazard is also useful reinforcement. Visible demonstration projects in the communities that are targets for public action could also be helpful. This information flow should capture people's attention, spark their interest, and make them begin to consider taking action to mitigate the risk. They need to discuss the risk at local organizations, seek out additional information on their own, and talk with friends and neighbours about it. This process permits people to gather information and form their own ideas about the level of risk and what they should do about it. People need to feel that taking some protective action is their own idea, but information ownership takes time. Preparedness and mitigation actions result from the whole process, not merely receiving a mailed brochure. However, supplemental information must be available in the local community for use during this process.

Line-up Multiple Sources of Information. It is easiest for people to attend to information if it comes from a group or a person they trust. Depending on age, education, class, and ethnicity, different people trust different sources. Some people want to hear about earthquakes from seismologists at the U.S. Geological Survey and about a problem at a nuclear power plant from a nuclear engineer who helps run it; others believe only what the Red Cross tells them; still others search for data sources online. It's important to use various sources to reach all groups in the community. Having multiple sources author single

communications or having the same communication come from multiple sources, or both, works.

Address a Diverse Public. Assume that your public is diverse; tailor information to the needs of each group. For example, the elderly have special needs, so create materials for them that speak to those needs. Don't ignore non-English speakers; write information in their languages or get your materials translated by knowledgeable local speakers of those languages. Some cultural groups choose not to read for information for reasons unrelated to literacy; to reach them, use radio and TV, word-of-mouth, or pictographic images. Use the media that serve multilingual populations. Special populations may require special communications, for example, people in the tourist industry.

Use Multiple Media. Now that we've had the information technology revolution, the sky's the limit. You can bounce a fact about hazard risk off satellites, insinuate it into electronic data networks, feature it on interactive computer games, add it to distance learning curricula, and project it onto the screen of the nearby theatre. Vary your spokes-persons as well: today, the Red Cross spokesperson on radio; tomorrow, cartoon characters on TV; next week, a scientist on the Internet. Effective public education programs should have the staff to constantly work the media angles and maintain contact with media personalities.

Use Media Appropriate to the Audience. The Internet is indeed a marvellous tool, but everyone doesn't use it. For example, text that can be downloaded from your web page is not the way to reach a non-English-speaking or low-income audience. Information for those groups can be disseminated through the community organizations and social service agencies that regularly work with that audience. Conversely, technologically sophisticated packaging gets middle-class, computer-using audiences where they live.

Make the Information Easy to Get. If public education is provided on an ongoing basis, successful public education works to change people's opinions about a hazard and to motivate people to do something to reduce risk. This happens when your educational efforts gets the public interested enough in the topic to talk it over with others and to reach out for additional information. You must not frustrate your public! Have information ready and accessible at the time someone is motivated to ask for it. In many cases, the wheel has already been invented. Share materials. Revise them. Adapt them. Translate them.

Use an Incremental Approach. Because learning is incremental, information dissemination should be, too. Organize the information you present to highlight related themes successively. For example, some education organizations or emergency services agencies distribute to participating communities monthly newsletters with reproducible masters on different aspects of emergency preparedness. In January, the spotlight is on home safety; in February, it moves to planning a family evacuation route.

Make your Approach Interactive and Experiential. We know that adults learn by comparing new information to what they already know, by thinking through and discussing the new concept or practice, and by doing. They don't sit passively and digest everything they hear or read. They do not enjoy lectures. Use models, visual aids, fancy media, and peer group discussions. Engage your audience; don't preach.

Use Other Disasters as Learning Opportunities. Send elected officials, government functionaries, corporate officials, school superintendents, various professionals, and community organizers to view emergency response to other disasters in other places. Have them report the lessons they derive for their community, business, school district, or practice. Such people typically return from their reconnaissance with better vision and a more active imagination than they had before they left. They have seen the truth and can communicate it to many others. They are motivated to do something, and can frequently infect others with their commitment.

Individuals Can Make a Big Difference. Never overlook the role of an individual in changing what the public thinks and does. There are many examples of hazard champions who single-handedly prod and cajole their organizations, schools, neighbourhoods, or governments regarding hazards. These individuals are both tenacious in their efforts to stimulate change and passionate in their belief that change is necessary. Finding, cultivating, and motivating such an individual can sometimes be the key to a successful public education campaign.

Evaluate Your Program

Build some sort of evaluation component into your education campaign for yourself and for others such as a survey that can give you valuable information in determining how effective your campaign was. When you assess the efficacy of your materials and approaches, you can revise what doesn't work or emphasize what does. Share that knowledge with other

educators, so campaigns across the country can benefit from your experience. Last, but not least, use your data to justify continued and increased financial support.

The Best Public Hazard Education Is Ongoing

If your organization funds a public education program, continue that support over many years. If you run a public education program, keep it highly visible and recognizable in the community. Programs that deliver helpful information over the years see their credibility and effectiveness grow. Don't decrease it by altering missions, or by changing logos or names. Be patient, and understand that good public education is a long haul.

Appendix 2

Identification of the strengths and weaknesses of various group and individual risk communication strategies. Taken from:

National Environmental Protection Council (1999) Guidelines on community consultation and risk communication. Canberra: National Environmental Protection Council.

Table 6-A

Consultation Techniques: summary of advantages and disadvantages

Group Techniques – Summary of advantages and disadvantages

GROUP TECHNIQUE			
TECHNIQUE	DESCRIPTION AND GUIDELINES	ADVANTAGES	DISADVANTAGES
Public Meetings	Usually more than 20 people; self selection by advertised invitation; formalised proceedings aimed at presenting information to large audience; conducted at a time and location to suit most people; needs to be widely publicised.	Provides a forum for information dissemination and exchange with large numbers; may incorporate other techniques such as workshops; brings a wide range of people together.	Focused discussion on one issue is difficult; more articulate and better prepared members of the community may dominate; less vocal sections of the community may not express their views.
On Site Meetings	Open air community meetings held on site or adjacent to the affected site to provide information, gauge interest and explain process and procedures.	Enables interested individuals to gain an understanding of the issues involved. Useful for site contamination as 'standing' on the site can remove some aura of the unknown.	Accessibility to site not always possible (aged and disabled) or convenient. Obviously, all necessary safety precautions should be addressed.
Search Conference	Usually 20-30 participants selected to be heterogeneous but sharing an interest; staged discussion aimed at identifying broad cross section of views on a variety of issues; lasting day, weekend or longer.	Can assist in the early stages of consultation process to identify community characteristics and relevant issues; program devised with participants; future orientated; allows lengthy discussion to develop and refine ideas.	Large time commitment; may appear to be an elite group; participants may not have necessary information; may tend to result in 'wish list' of unrealistic future requirements.
Design Meeting	Community members meet to work on maps, scale representations and photographs to gain better idea of the effect on their community of proposals and options; expert presenters may be required.	Allows community members to better express their views and visualise the impact of changes; enables consultant to understand how a proposal appears to the community.	Numbers of participants limited; limited technique if complete socio-economic and environmental impact to be determined.

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Group Techniques – Summary of advantages and disadvantages

TECHNIQUE	DESCRIPTION AND GUIDELINES	ADVANTAGES	DISADVANTAGES
Workshops	Participants are usually homogeneous in terms of skills and concerns; structured sessions aimed at encouraging open discussion between participants, and producing proposals for solutions.	Provides for all stakeholders to contribute; a flexible technique which can be used at all stages of consultation process; can provide a forum for testing alternatives, training opportunities, information gathering and dissemination, receiving feedback and refining input.	If the participants are specifically selected then the nature of this technique can result in it appearing exclusive; the specific workshops may restrict discussion and debate.
Seminars	A meeting where a particular subject is explored in depth for some length of time under expert guidance.	Opportunity for learning and information sharing; detailed discussion and inquiry can take place; all participants can question or contribute.	The 'right' expert may not be available; participants may not be adequately prepared; experts may dominate and inhibit discussion.
Consultative Liaison Committee	Committees vary in size but rarely involve more than 15 members; members could be elected or appointed by initiating agency; may be set up to provide on-going advice and monitor stakeholder views or specialist issues; a specified 'life' is advised, the initiating agency is vital in continuing to support the Committee.	Provides on-going advice and communication on developing policies or proposals; provides an excellent liaison and public relations tool; stakeholders can contribute to and monitor planning process; concerned community members can identify and seek measures to resolve problems; community representatives can become familiar with the consultation and planning process; builds trust between the stakeholders.	Has little accountability to the community at large; meetings can be time consuming and dominated by members; knowledge and experience may be non-representative of the community unless great care is taken in selecting members.
Public Forum	A meeting where participants can express their views and share information following a speaker etc.; attended by individual representatives nominated by existing groups and associations; set up for exchange of views between the community and consultants.	Brings a range of people together; allows for people to respond to the proposals or options; helps develop opinions by testing ideas; can contribute to development of consensus before action taken.	Ability of facilitator is critical to success; controversy and debate may become entrenched and reduce opportunity for consensus; 'glossy' presentations can mislead an ill-informed audience.

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Individual Techniques – Summary of advantages and disadvantages

INDIVIDUAL TECHNIQUE			
TECHNIQUE	**DESCRIPTION AND GUIDELINES**	**ADVANTAGES**	**DISADVANTAGES**
Individual Discussion	Selected individuals consulted by telephone, meetings and door knocking an area.	Provides a quick and efficient means of disseminating information and identifying a range of issues and views.	Provides limited opportunities for large numbers of community members to participate in the process; does not allow for broad-scale exchange of ideas.
Submission	Oral or written submissions to enable people to register their ideas and concerns; open to the general community and usually undertaken in the early or later stages of a consultation.	Political and institutional demonstration of commitment to open consultation; provides focus for groups to organise a basis from which to lobby; provides consultant with some information on viewpoints of key stakeholders.	Limited role as submissions are unlikely to draw response from minority groups in the community; only 'organised' and articulate stakeholders are likely to respond; the formality of hearings may intimidate some.
Survey	Structured questioning of community sample which statistically represents the whole population or sector; used to gather information about objective characteristics or attitudes of a community.	Provides data for analysis of characteristics of a community; provides data to document probable effects of a proposal; satisfies a political need to gauge likely public reaction to a proposal.	Minimal discussion and no interaction between members of the community; respondents may be indifferent to the subject matter and require persuasion.
Open Houses	Informal arrangement where tables or booths are manned by knowledgeable government staff or consultants who are able to discuss what individuals in the community want.	Sets up a comfortable discussion situation for staff and members of the public. Especially useful early in the process to establish rapport and explain complex processes.	May be seen as a "conquer and divide" technique if distrust of the consultants and government by the public is already high.
Display and Exhibitions	Means of disseminating information to the community; mobile or permanent exhibition; may be staffed for seeking response and giving detailed explanation.	Opportunity to inform and meet with the wider community who can speak directly to the consultants; opportunity to demonstrate commitment to consultation.	May be costly and ineffective, particularly if the community does not perceive the issues as being of high importance.

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Individual Techniques – Summary of advantages and disadvantages

TECHNIQUE	DESCRIPTION AND GUIDELINES	ADVANTAGES	DISADVANTAGES
Observations	Means of gathering information and establishing contacts in a community.	Provides a thorough understanding of the community in preparation for consultation.	This technique is generally only suitable in the early information collection stage of a consultation.
Information Bulletins and Brochures	Regular information bulletins and brochures distributed to households and/or made available to the community at key public outlets.	Provides ongoing information on the project.	Information needs to be multi-lingual and distribution needs to ensure that the all those interested receive the information.
Site Office	Temporary accommodation for consultants in the area; provides information for the wider community; needs to be suitably located and staffed.	Provides consultants with a convenient base from which to work and establish contact in the area; satisfies some community needs for individual attention to their issues and concerns.	Does not involve interaction between members of the community and may be costly; has limited value in the overall consultation process if used alone.
Open Door	Conducting periodic open days to invite interested people and complainants to visit the site.	Can shift community confidence in current and proposed operations; pin point particular problems and result in problems being address and resolved.	May not be possible given commercial confidentiality.
Hot line	A telephone service to provide information and to record comments, concerns and suggestions.	Ensures that information is available; provides the opportunity for the wider community with mobility problems.	Would not reach all people from non English speaking backgrounds unless hot line is available in different languages.
Web Sites	Information dissemination through an interactive web page; aimed at informing and generating interest	Keeps the public and other interested parties informed. Can be updated quickly and easily. Allows people to access large amounts of information and provide feedback.	Can only be accessed by those with access to a computer with Web connection. Tends not to be available to minority groups such as the elderly, poor, people with non-English speaking backgrounds. Can contribute to information overload if not managed effectively.

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Individual Techniques – Summary of advantages and disadvantages

TECHNIQUE	DESCRIPTION AND GUIDELINES	ADVANTAGES	DISADVANTAGES
Use of Media	Information dissemination through printed and electronic media; can be aimed at informing or generating interest and feedback.	Political and institutional advantages of ensuring that information is provided; keeps the community informed; provides opportunity for all the community to contribute.	Would not reach all groups unless special attention was given to minority groups by the use of ethnic media and other avenues to reach other target groups.

Sourced and adapted from:
Department of Housing and Urban Development, SA *The Human Services Planning Kit*, February 1994