Understanding Community Response to Wildfire

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Abstract

Traditionally fire services have assumed responsibility for managing wildfire events leaving the public in a largely passive role. However, the adoption of community safety focus has increasingly emphasised the need to engage residents in taking greater responsibility for their own safety during such events. It is now widely recognised that fire services are unable to provide protection to every property during major incidents and that effective community response is essential to ensure safety and protection of property.

However, there is limited information about how communities perceive the wildfire risk, their capacity to respond or their needs in relation to emergency events. Recent research undertaken in a variety of settings now provides us with an understanding of these issues and provides a sound basis on which to develop more effective approaches to effective community response to wildfire. The research provides a basis for measuring preparedness for wildfire and establishing benchmarks against which to assess the effects of programs to increase community preparedness.

The presentation details findings from recent large-scale studies of community response to wildfire. The studies include the survey of 1200 residents affected by the NSW 2001 fires undertaken by this Rhodes and Odgers on behalf of AFAC, and a major quantitative study of preparedness in Victoria completed in 2002 by CFA. The results of these studies have not previously been presented.

Paper

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Introduction

In the past decade there has been a shift amongst emergency management organisations to acknowledge that reducing the risk from hazards, such as fire, will be enhanced by the ability of the community to respond effectively. Many emergency management organisations, including fire services have adopted a risk management approach with greater emphasis on prevention and community education (Smith et al., 1996). A key element of this shift has been a focus on involving communities in partnerships with emergency services organisations to deal more effectively with risks.   In this new paradigm, a safe community has been defined as, 'locally organised and resourced, well informed about local risks, proactive in prevention, risk averse, motivated and able to manage the majority of local issues through effective planning and action' (Hodges, 1999, p.2). The notion of community self-reliance is often used to encapsulate these ideas.

In a country of relatively few natural hazards, major fire events represent markers in the State's history and the media commonly use dramatic descriptions of firestorms, and disasters that reinforce myths that wildfires are 'unsurvivable' and that there is little people can do to

protect their homes. Since the 1983 Ash Wednesday fires, many fire services have promoted the idea that communities can play a greater role in protecting themselves from the threat of wildfires. A review of major fire inquiries (Petris, 1995) suggested that fire services have a limited capability to contain such fires but that there is a great deal residents can do to reduce the impact. In particular the research highlighted that a well-prepared house, defended by able-bodied persons can be protected from a wildfire and also provide adequate protection for residents. Similarly, if residents have made a decision to leave the area before a fire threatens, the risk to life is also minimised. Australian fire services have promoted the view that residents need to take responsibility for their own safety by being prepared and by deciding in advance, what they will do in the event of a fire.

Preparedness

In 1999 CFA undertook several studies to investigate preparedness, in particular how residents in wildfire prone areas understand the fire risk and what is needed to deal with it. One study (Rhodes and Reinholtd, 1999) sought to define what constituted preparedness. The study, using a range of expert input identified nineteen elements of preparedness grouped into 5 key dimensions:
(a) *Awareness and recognition* of the wildfire risk;
(b) *Knowledge* of fire behaviour and fire safety measures;
(c) *Planning* for the event of a fire;
(d) *Physical preparations* of property and household, and
(e) *Psychological readiness* involving confidence and self-reliance.

The nineteen elements in the model identify those critical aspects that need to be addressed in order to be effectively prepared. However they do not constitute a prescriptive list of actions. For example 'appropriate house modification and maintenance' is an element identified as part of the physical preparation dimension but there are many ways this could be done depending on the situation. The model does propose that if the elements included in each dimension are not addressed then the risk of loss of life or property damage is likely to increase.

Another component of the study sought to gain an understanding of what residents of high fire risk areas considered effective preparedness and the factors they identified as influencing their preparedness. Most participants acknowledged that they lived in an area where there was a significant risk of a wildfire. However, people interpreted the risk differently, reflecting different beliefs about the source and nature of the risk. People who saw the risk as a natural part of the environment tended to have undertaken more preparation than those who saw the risk as an external threat resulting from the negligence of others or the inaction of local government. There was also variation in how people saw responsibility for dealing with the risk, their priorities, and the barriers to being prepared, and so on. Not surprisingly the level of preparedness also varied greatly. Although most people had undertaken some form of preparation the level of activity often did not match their stated intention of what they would do if a fire occurred, or with their level of confidence about what they had done to prepare.

The level of understanding about wildfires and their effects also varied greatly. Many people explained their intention to leave on the grounds that they believed a house could not survive a wildfire. There were also differences in people's expectations about what would happen during a fire. Many respondents believed that they would receive greater assistance in the form of advice and information than they are actually likely to receive. People's 'plans' were

generally appropriate with what they *expected* would happen, but often their expectations failed to take account of the reality of a wildfire.

Overall, the study highlighted the diversity in understanding and intended response to the wildfire risk. For most respondents, the wildfire risk was something they were conscious of and had attempted to deal with. However, most had a very limited frame of reference against which they could compare their understanding or preparations due to lack of direct experience, limited knowledge about the risk and naïve expectations. The level of preparedness undertaken by most people tended to reflect their incomplete understanding of the risk.

The studies highlighted that even though it is possible to identify some measures that are more effective than others, preparedness has to be defined relative to a particular social and physical context. Consequently it is inappropriate to think of people being either 'prepared' or 'unprepared. Furthermore, although there are more or less effective ways of dealing with the risk, preparedness is not a continuum because effective preparedness in one set of circumstance may be inappropriate in another. Effective preparedness is best thought of as a particular combination of the elements encompassed in the five dimensions of preparedness that are appropriate to a specific social and physical context. From this perspective effective preparedness for two households in the same location may differ markedly in terms of how they address each of the elements in the key dimensions of preparedness. Such differences reflect the complex set of attitudes, knowledge, skills and resources that underpin the choices people make in response to the risk Furthermore, effective preparedness also needs to be defined relative to the severity of a fire event. What is effective during one fire may prove to be ineffective in a more severe fire.

The implication of this view of preparedness is that to a large extent, only the residents, suitably informed about the nature of the risk and options for precautionary measures, are able to determine what is appropriate for their particular circumstances. Fundamentally, the level of preparedness is the result of a decision-making process that reflects the choices people make about how to use their skills and resources in response to how they perceive and understand the risk

Decision-making in response to risk

When people become aware of a hazard and its potential to affect them, they make decisions about how they will respond to the risk. For some, this is a considered process of information gathering, decision-making and deliberate action. For others it may be an 'unconscious', relatively spontaneous response to the realisation that the threat exists, in which case 'preparedness' might consist of the intention to flee at the first sign of fire. In other words, it is suggested that everyone makes choices about how to use or not use their skills and resources in relation to the risk.

The choices people make reflect the influence of a array of factors such as their perception of the risk, personal attributes, experiences, situational factors, social influences and so on (Rohrmann, 1995). The decision-making process that potentially leads to effective preparedness can be represented in a four stage process of responding to the risk; recognition of the risk, risk re-appraisal, adoption of precautionary action and implementation of action. Information about risk is only likely to result in change if people assimilate new information that challenges their existing way of thinking. However, since decision-making is influenced

by a wide variety of factors, there is no automatic process by which information is assimilated, resulting in change. For various reasons, information may be rejected or misinterpreted resulting in unintended outcomes or no real changes in the level of preparedness.

Measuring preparedness

The model of preparedness has identified a set of critical elements grouped into five dimensions that need to be addressed in order to achieve effective preparedness. It also highlights the role of choice, the diversity in forms of preparedness and the importance of the social and physical context. The model also provides a basis for defining a set of indicators that can be used to measure each dimension of preparedness as listed in table 1.

Each of these indicators is made up of several items in a survey instrument and can be used to construct an index of a score on a ten-point scale for each dimension of preparedness. When combined these indices can be used to construct a profile of the level of preparedness of particular communities, enabling the establishment of benchmarks and comparisons over time. The survey instrument has been applied in several large-scale studies. These include a survey of 1200 residents in six locations in NSW after the wildfires of January 2001 (Odgers and Rhodes, 2002), and in a study of six Victorian communities in the urban-forest interface areas of outer Melbourne in 2002.

Table 1: Indicators of the key dimensions of preparedness

Dimension of preparedness	Label	Indicator	No. of items in indicator
Awareness & recognition of risk	Risk	% indicating high likelihood of fire occurring in next five years *and* high likelihood of fire causing damage to properties in the area.	2
Knowledge of wildfire	Knowledge	Standardised score of correct responses to range of items relating to fire behaviour, fire safety and expectations of what is likely to happen during a fire.	
Preparation actions	Preparation	Standardised score of self reported wildfire preparation actions such as house design and maintenance, personal protection and house protection.	
Planning for wildfire	Planning	Standardised score measuring extent of planning such as whether plan exists, is written, extent practised, discussed within household, communicated to others and whether it considers needs of different members of household. A supplementary indicator of % reporting particular intended response if a fire occurs has also been developed	
Psychological readiness	Readiness	% reporting high level of preparedness *and* high perceived level of ability to cope if fire occurs	2

Results from the Victorian study conducted in 2002 provide examples of the levels of preparedness in several communities. Figure 1 shows the preparedness profile of two Victorian communities, Research and Upper Beaconsfield constructed by using the indicators listed in table 1.

The profile depicts statistically significant differences between the two communities on each dimension of preparedness. Upper Beaconsfield shows a higher level on each dimension of preparedness than Research. For example in Upper Beaconsfield 81% perceive risk of fire occurring and impacting as high compared with just over 58% in Research. Further while the level of knowledge is somewhat closer (6.1 compared with 5.2) the differences in level of preparation actions reveal a greater difference (7.3/5.7) between the two communities. Both locations reveal relatively low levels of planning although Upper Beaconsfield is significantly higher than Research (4.5/2.6). Residents in Upper Beaconsfield also indicated higher levels of readiness compared with Research (59% compared with 49%). Overall the profile provides a simple but comprehensive representation of preparedness in particular communities.

Figure 1: Preparedness profiles
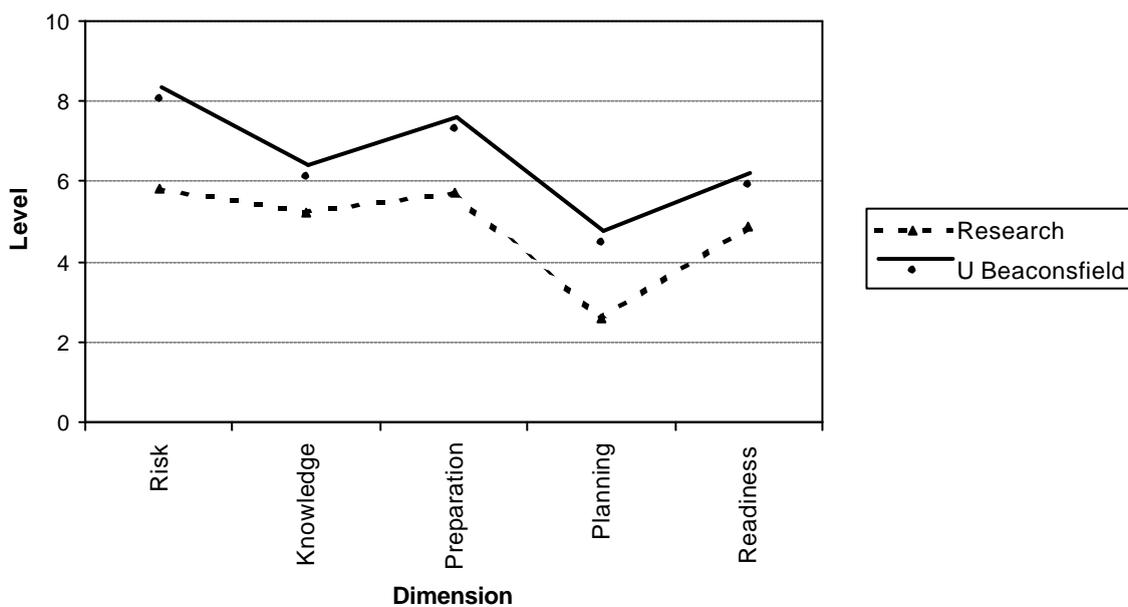
The data provided by the survey can also be used to analyse a particular dimension of preparedness. Examination of the preparation dimension of preparedness also identifies significant differences across different locations as shown in figure 2.

Figure 2: Error bar chart of Mean preparation levels by location

1 Research
2 N Warrandyte
3 Menzies Creek
4 Panton Hills
5 Cockatoo
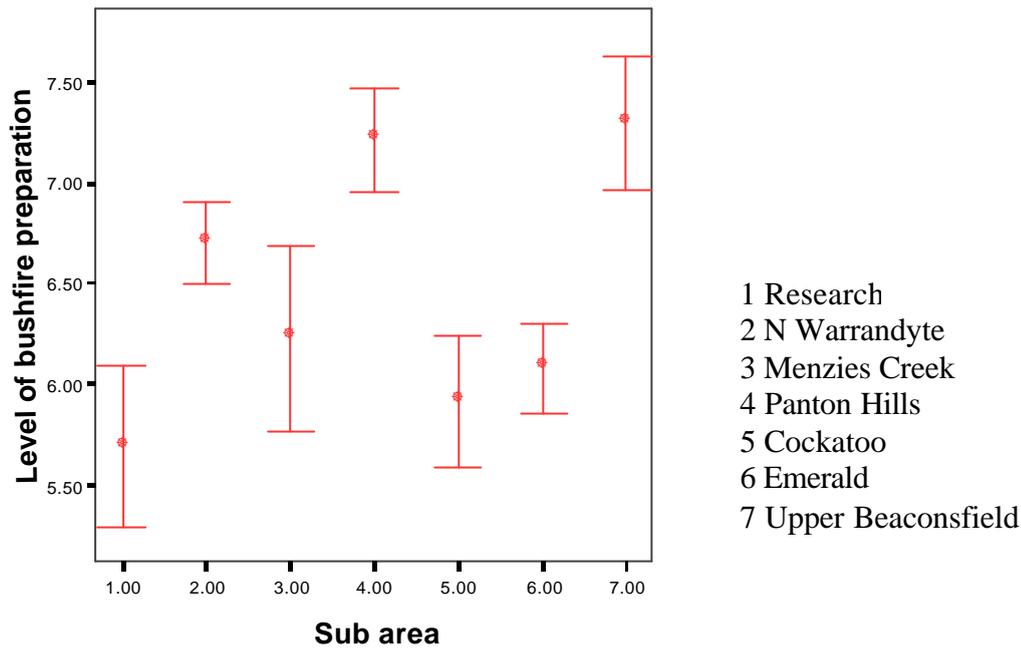6 Emerald
7 Upper Beaconsfield

Figure 2 shows the mean score of the level of wildfire preparation activity by location. The upper and lower limits show the possible range for each location based on 95% confidence interval. If the upper and lower limits on any two locations do not overlap there is a statistically significant difference in the level of preparation activity between these locations. Panton Hills and Upper Beaconsfield have significantly higher levels of preparation than other locations, whereas North Warrandyte is also significantly different from three of the other locations.

The survey data can also be used to investigate differences on individual items, for example, the level of adoption of various preparation measures. Overall, some of the more simple measures are widely reported by respondents. For example 86% of respondents reported removing fine fuels from the area around the house and 82% reported having buckets, ladders and mops that could be used for firefighting. Many such measures could be 'accidental' preparation being undertaken for reasons other than dealing with the fire risk. More significant measures that are specific to defending a property from fire were much less common, for example only 54% reported having a pump and/or hoses for firefighting, and only 42% reported having prepared a kit of personal protective clothing.

There were also significant differences on particular measures such as purchase of firefighting pump and/or hose between locations as shown in figure 3. The data also highlights that the level of resistance to adoption also varies significantly by location such that nearly 40% of respondents in Cockatoo indicated they were unlikely to purchase such equipment.

Figure 3: Likelihood of purchasing fire fighting equipment by location

Likelihood of purchasing fire fighting equipment
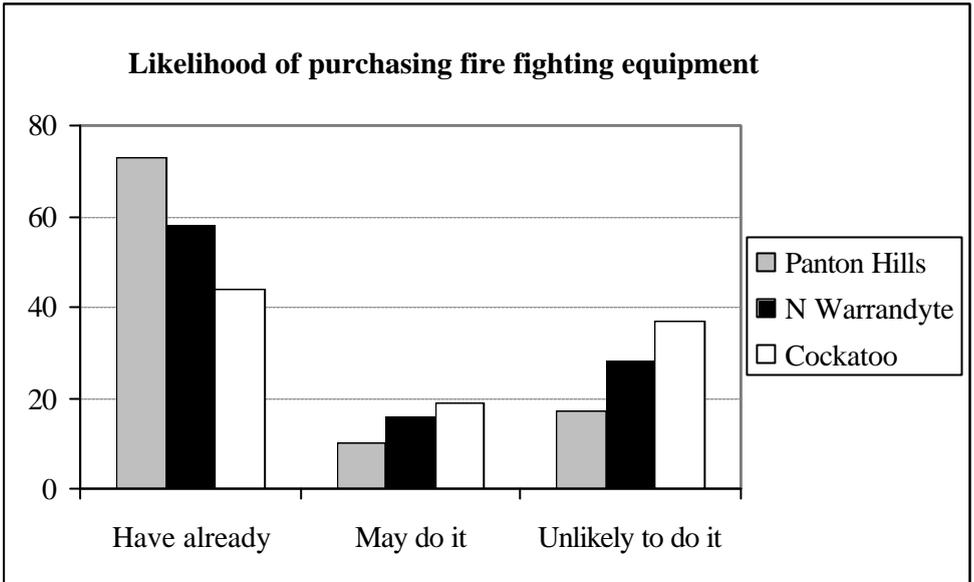
Another indicator showing intended response can be used to identify the proportion of the community intending to adopt particular response strategies should a fire occur as shown in Figure 4. The categories of intended response have been defined based on observations of community response during fire events and surveys in a number of post incident analyses conducted by CFA (Reinholtd et al, 1999, CFA)

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Figure 4: Intended response if fire occurs by location
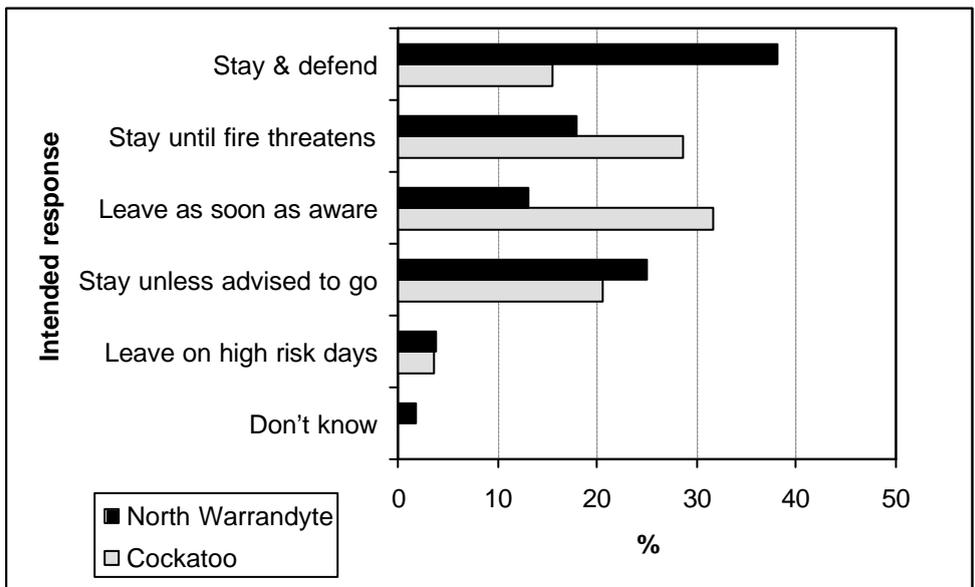
In North Warrandyte 38% intend to stay and defend their property throughout a fire compared with 15.5% in Cockatoo. This profile of intended response shows that residents in these locations are likely to respond quite differently if a fire occurs. However, while in both

locations approximately 75% of respondents who intend to stay and defend their property could be classed as having undertaken quite high levels of preparation activity, nearly a quarter of the respondents who intend to stay could be classified as having taken only moderate or lower levels of activity (<6 out 10 on standardised score for preparation actions).

The data presented in this paper represent a small selection of the information obtained from using the survey instrument based on the model of preparedness. Preparedness profiles can be constructed for various locations and each dimension can be explored in ways illustrated above to produce comparative results between locations and over time.

Summary of key understandings of preparedness

The multi-dimensional model of preparedness presented in this paper involving awareness and recognition risk, knowledge, preparation, planning and readiness provides the basis for describing preparedness and the extent to which people are able to deal with the risk. Furthermore the model proposes that there is no single way of being prepared but that there are multiple forms of preparedness, the appropriateness of which depends on the social and physical context. The model also suggests that preparedness is best understood as the result of a decision-making process in which people make choices about how to use their skills and resources to deal with the risk in their particular situation. The model also recognises that the decision-making process is complex and influenced by many factors resulting in different outcomes dependent on the context.

The use of the preparedness survey in a number of different studies enables some tentative conclusions to be drawn about the level of preparedness of the community and what is required to increase community capacity to deal with the risk. These are summarised below.

Generally, people living in wildfire prone areas are aware of the risk and recognise that there is a high likelihood of wildfire affecting the area in which they live over the short term (5 years). The survey of Victorian communities showed generally high levels of perceived risk whereas the level of perceived risk was lower in NSW communities (Odgers and Rhodes, 2002). This may be because after a fire has affected the area, people may believe the chance of fire occurring again has been reduced or because they have survived it and therefore feel less at risk. The high levels of perceived risk in the Victorian communities suggest that at least in these locations programs to increase awareness are probably unnecessary and unlikely to have an effect.

The level of knowledge about wildfire varies greatly. While it appears that some of the more basic matters about wildfires are widely known, many myths persist. Knowledge about wildfire is necessary to be well prepared, but in itself it is not sufficient to *ensure* preparedness. The studies indicate that there are many who are poorly informed and believe many of the myths about wildfire. There are also those who are quite well informed but not necessarily well prepared overall. Finally depending on the location there is likely to be a significant minority who have acquired a good understanding of wildfire and have applied it to become well prepared. The level of knowledge appears to vary greatly between locations and there were significant differences on the overall level of knowledge and on specific items between Victorian and NSW communities. However a critical implication of these findings is that programs that focus on delivering information are unlikely to make a significant difference in increasing preparedness.

The level of preparation activity also varied greatly. Some measures were widely implemented such as clearing gutters and cutting back trees and shrubs around the house. However, more significant measures such as purchasing pump and fire fighting hoses, preparing a survival kit and sealing gaps around the house were much less common. There were significant differences between the levels of activity in different locations. All the Victorian communities reported significantly higher levels of preparation activity than the NSW communities surveyed. It is clear that while most people undertake some actions that contribute to better preparation, the level of activity in most of the surveyed communities was moderate at best. Furthermore, there were high levels of resistance to taking some of the more significant preparation measures.

Planning for wildfires is a complex task and the survey results indicate that while most people have considered what they will do if a fire occurs the extent of planning for the event is generally low. It appears that most people do not understand what is involved in effective planning or are unwilling to undertake the activity. Fire services have advocated that people must decide whether they will stay and defend a well-prepared property or leave before a fire threatens. However, in many of the locations surveyed only a minority indicated either of these preferred options and some of these had undertaken relatively little preparation activity. Despite the lack of planning overall, in some locations, particularly in some Victorian communities, around 50% indicated they had undertaken extensive preparation and had a reasonably well-developed plan.

The readiness of residents in wildfire risk areas is difficult to assess. The indicator used measures perceived level of preparedness and ability to cope if a fire occurs. The qualitative study referred to above (Rhodes and Reinholtd, 1999) suggested that some people appeared very confident even though they reported only moderate level of preparation activity. Similarly there were some cases where people appeared to be well informed and prepared but lacked confidence in their ability to carry out their plans. Interestingly residents of the NSW communities surveyed after the major fires reported higher levels of perceived ability to cope than the Victorian communities even though the Victorian communities were overall significantly better prepared. In the NSW survey the fire reached the property of about half the respondents and about a quarter experienced damage on their property. It may be that the relatively low levels of impact of the real events in NSW led respondents to have a greater sense of their own capacity whereas the Victorian communities were responding to unknown or imagined events. The readiness indicator is highly subjective and influenced by a wide variety of personal and situational factors. Nevertheless in the Victorian survey those who rated their readiness high were significantly better prepared and planned than those who rated their readiness at a lower level which suggests some degree of reliability in these self assessments.

Working with the community

The results presented in this paper highlight that there are significant differences in the levels of preparedness within and between communities. The proportion of a community whose level of preparedness is more likely to be effective during a fire varies greatly. In some of the surveyed communities approximately half the population might be considered moderately to well prepared. However, in many communities the level of preparedness was lower, with a large proportion of the population poorly informed and prepared. As discussed there are many factors that are likely to determine the extent to which people become prepared. One of these factors is the extent to which the community is exposed to information and programs

to increase preparedness. Evaluation of CFA community education programs (Rohrmann, 1999, CFA 2001, CFA 2002) indicate that such programs do lead to increased preparedness, but also that change is not uniform for all participants and that it is incremental and occurs over the long term.

The model of preparedness and the role of decision-making as presented in this paper have major implications for the design and implementation of programs intended to increase the level of preparedness. Effective programs need to engage people in reconsidering their understanding of the risk, provide relevant information and facilitate the assimilation of new information into their way of thinking, and eventually lead to changes in their response to the risk. Programs also need to present people with options about how they can deal with the risk in ways appropriate to their particular situation. Increasing people's understanding of risk and its implications and encouraging them to adopt new behaviours is a complex task. It is time government and agencies stopped pretending that awareness raising campaigns and information dissemination will ever be sufficient or effective. Appropriately designed and resourced community education programs can increase preparedness but it is probably unrealistic to expect that the majority of people exposed to the risk will voluntarily undertake sufficient measures to become well prepared and self reliant.

In any emergency agencies will have to deal with people with varying levels of preparedness and capacity to deal with the situation. Developing new ways of working with the community during emergencies offers new opportunities to improve community safety. In particular the nature and extent of information provided to communities during the fire is likely to be critical in ensuring the safety. In the survey of NSW communities it was clear that people wanted to obtain specific information about the location and direction of fire and what to do to protect their homes. However less than half indicated they received such information (Odgers and Rhodes, 2001). Instead they were more likely to have received general information about the fire situation or what the emergency services were doing in response to the fires.

During the 2003 alpine fires CFA and the Department of Sustainability and Environment made extensive efforts to provide information to increase preparedness and the effectiveness of the community response. A survey of 600 households conducted throughout the fire affected areas found that during the fires nearly 90% received information about the location and direction of the fire, as well as information about how to protect their homes and personal safety. About two thirds received a warning before the fire threatened their property. Approximately 40% of respondents reported making significant improvements in their level of preparation and over 90% felt well prepared by the time the fire threatened their property.

Clearly the extended duration of these fires provided emergency services with time to set up processes to inform the community and for the community to put it into practice. Nevertheless, the experience of these fires suggests that information provided during the emergency, can be assimilated by the community and trigger the decision-making that the model suggests underpins changes in preparedness.

Conclusion

The model presented in this paper has enabled the development of a survey tool to measure the level of community preparedness and also provides a useful diagnostic tool to assess and monitor changes in the level of preparedness. The application of this instrument has revealed

the complexity of the issues and diversity in the level of preparedness in the community. The model is also fundamental to understanding the types of programs and opportunities that are likely to be effective in increasing community preparedness.

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