The missing links in community warning systems: findings from two Victorian community warning system projects

Robyn Betts identifies the missing links in warning systems development through analysis of two recent Victorian projects

By Robyn Betts

This paper confirms the identification of principles that have been developed by Handmer (2001) to determine the effectiveness of community warning systems and suggests that there are also processes which link these principles defining the relationship that the principles have to each other. The research and explanations of community warning systems to date has been extremely limited with a focus on warning technology solutions and descriptions of warning system operations. Effective warning systems have been defined as 'total' or integrated systems but the linkages that connect and define the relationship between the warning system elements have not been clearly identified or analysed. Two recent Victorian projects that have involved the development and implementation of community warning systems have also provided research opportunities to explore these 'missing links'. These links are supporting the value of a bottom-up approach to community warning system development involving community engagement and are reinforcing the place of both theoretical principles and process in community warning system development.

Introduction

The existence of community warning systems confirms the presence of people living with risk. The impact of an emergency on a community where there has been little of no warning to that community often prompts public criticism and has reinforced the public's perception about the necessity and value of receiving early warning and information communication.

The review of the Kempsey Flood 2001 reported in Risk Frontiers—NHRC newsletter (March 2002, Vol 1, Issue 3) identified the concerns that the public had about the way in which warnings were communicated and the public's expectations that they would receive timely and accurate warning information from the emergency services.

The Victorian State Coroner's report into the 1997 Ferny Creek bushfire that claimed three lives, identified the importance of "early warning to residents in areas of particularly high fire risk." (Betts, 2001)

The development of warning systems has evolved from the continuing need by emergency managers for accurate predictive information through which emergencies can be managed. The research into flood warning systems has confirmed the advantages of the public being provided with warning information as part of a process to share the responsibility of risk management between emergency services, local government and community.

Warning systems have been developed to reinforce the importance of emergency preparedness as well as being an essential component in the emergency response to hazards such as flood, cyclone, earthquake and storm surge.

Emergencies which are defined as having minimal warning time such as wildfire, flashfloods and industrial incidents have, in contrast, stimulated a debate about the efficacy of community warning as an essential component for 'survival' and emergency management. The debate has revolved around an emphasis on community participation in emergency preparedness through community education and the development of household emergency preparedness and survival

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plans in isolation of the need to provide the public with emergency warning and alert information.

The limited research on community warning systems where the community has been consulted (a bottom-up approach), has identified that the existence of warning mechanisms such as a siren or radio message process can promote perceptions of public confidence about community safety. (Betts, 2001. Parker, 1999)

The research into community warning systems has, over the past ten years, provided descriptions of warning technology solutions and highlighted the challenge to refine the accuracy of predictive emergency information. Community warning system research has also focused on the hazards of flood and cyclone rather than on emergencies that have little or no warning time. The development of evaluation methodology that would enable the analysis of community warning system efficacy as components of emergency management has been minimal (Betts, 2001, Parker 1999). The majority of the research conducted has adopted case study descriptions of a warning system's operational procedures.

The exception to this has been the continuous exploration undertaken by Handmer to identify 'success principles' of flood warning systems (Handmer, 2001. Parker and Handmer, 1998.). These principles have included:

- the public's access to both formal and informal sources of warning information
- the value of 'shared understanding' between the public and emergency managers about the warning message and process
- inter-organisation cooperation
- the recognition of local needs.

It is only recently that two projects in Victoria which have been set up to develop community warning and information systems have taken up the opportunity presented by Handmer's explorations. The ability to underpin each of these project plans and activities with applied research methodology has also provided opportunities to analyse the value of Handmer's warning system success principles. Significantly the methodology has enabled the linkages connecting these principles to be explored and defined. It is suggested that the exploration and definition of these linkages has assisted the construct of 'community warning' to be evaluated within an integrated and systemic framework of emergency communications.

Two Victorian projects developing community warning systems

Ferny Creek fire alert siren evaluation

The evaluation of the Ferny Creek Fire Alert Siren (Betts 2001) used a strategy of participation research that enabled the processes and principles of this fire alert siren's development and operation to be mapped and analysed. A multi-agency and community-working group initiated and facilitated this project. The project aimed to adopt a community engagement process and supported the development of inter-agency partnerships. The evaluation strategy was developed in collaboration with the working group and was implemented alongside the development and initial trial operation of the fire alert siren. This enabled the Project's evaluation to address:

- The impact of the community communication strategy
- The process of the activities and communication of the Project's working group—including the working group's communication with the Ferny Creek community
- The impact and consequences of the fire alert siren's development and operation on the safety and bushfire survival behaviour of the Ferny Creek residents.

Coode Island community warning and information system project

Coode Island is an industry site located within the Melbourne Port vicinity and is used as a chemical storage site for chemicals used in the manufacturing industry. Coode Island is surrounded by other industries that also use hazardous and dangerous chemicals.

The project was set up to develop a warning and information system for the communities residing near the major hazard facilities sited on and around Coode Island. It incorporated many of the findings from the evaluation of the Ferny Creek Fire Alert Siren and also aimed to define and explore those processes which would link together the principles of community warning systems.

This project has undertaken significant community consultation (resident survey, community group focus discussions, one-on-one interviews) and has focused on stakeholder partnership and communication and the coordination of stakeholder emergency management plans as part of the municipal emergency management plan to improve the safety, confidence and preparedness of the community. This focus provided a contrast to the dominant direction of community warning system development whereby the focus is usually on the design and implementation of community warning technology solutions.

Both projects have significantly contributed to the identification and analysis of the 'missing links' that support the systemic processes of community warning and information communication.

The links between the public and the community warning system

Handmer states *"if people at risk are to take action then warning messages must mean something to them."* (Handmer 2001, pg 7) Consultation with the community by public sector organisations such as local government and emergency services has been influenced by the assumptions that the public does not have the 'expert' knowledge to actively contribute to planning decisions, that the public aren't interested in contributing to the planning process and that the public want to be told what they need to do. Community consultation has tended to be dominated with resident surveys whereby members of the public are asked for an opinion about a specific issue. This level of community consultation however is still regarded as a tokenistic approach to community participation (Bishop and Davis, 2002). It maintains the community as 'passive recipients rather than being active players' (Esplin, 2001), and continues to support a top-down model of community participation (King, 2002).

The principle of 'developing shared understanding' about the message and expectations of community warning requires an understanding of the population at risk. (Handmer et al) The Ferny Creek Fire Alert Siren working group aspired to involve the specific community in the development of the alert siren's design and operation. The working group included community representatives who had an enthusiastic commitment to the introduction of an early warning system for the area. These residents' consistently communicated updates about the project to other residents within the community. A Resident Sub-committee was recently established to support the continuing management of the alert siren system.

The working group's community communication strategy initially included a resident survey conducted to seek the identification of a preferred alerting procedure and to guage the level of bushfire survival preparedness evident within that community. The communication strategy enabled a number of public meetings to be convened and a door-knock campaign to disseminate community safety and preparedness information to be conducted. The strategy also provided for the production of newsletters to communicate the operation system of the fire alert siren and to reinforce the bushfire survival and preparedness messages of the fire service and local government.

The public meetings held prior to the siren becoming operational also reinforced the importance of bushfire survival planning and preparedness and emphasised the

relevance of the alert siren as only one component within a plan which would include a range of preparedness and survival actions. The Ferny Creek project's working group used an analogy of a jigsaw puzzle to demonstrate that the fire alert siren was only one piece in a preparedness and survival plan.

In spite of the community communication strategy, the initial evaluation revealed that the community residents didn't have an accurate or shared understanding of the fire alert siren during the first year of operation, consequently the range of resident actions which would occur as a result of the siren sounding indicated that not all residents identified the value of the fire alert siren as a contribution to their own bushfire survival plans. They did however regard the fire alert siren as providing a contribution to the safety of the broader community.

The working group identified the importance of the Community Fireguard program conducted by the CFA and telephone trees as other sources of survival and emergency information and supported the community engagement process for this project. The follow-up evaluation conducted at the conclusion of the 2002 fire season has revealed that in spite of the best intentions by some committed residents, the existence of Community Fireguard has not had the ability to engage all of the residents within this community and the telephone trees do not seem to offer all residents access to local information and support.

The initial evaluation strategy adopted a process to conduct direct and semi-structured interviews with the community residents. This personal contact combined with a 'door-knock' campaign initiated by the local government as part of a community communication strategy was regarded by the residents as a valued opportunity to discuss the fire alert siren and other aspects of bushfire survival planning. This process was identified as a constructive element to involve the community and provided an opportunity for residents to 'have a voice'.

The Coode Island Community Warning and Information Project took up the challenge to 'engage the community' and set up a process to achieve a shared understanding of a proposed warning message by initially exploring the culture and needs of the community. The findings from the Ferny Creek Fire Alert Siren evaluation identified that more localised information about the community was required to define the context within which to design and operate a community warning system.

Although the Coode Island project also used a community survey tool as an initial phase of a community consultation process, the survey was structured to collect a broader range of information than the survey delivered to the Ferny Creek community. The Coode Island community survey asked open-ended questions which:

- identified the culture of the residential community surrounding Coode island
- prioritised the perceptions of risk as defined by the residents
- identified the formal and informal communication sources which residents used on a regular basis
- clarified the residents expectations of the major hazard industries, the local government and the emergency services and
- identified how residents would accept a warning message.

The questionnaire was extensive and demanded a considerable commitment from the residents but it achieved a 14 per cent response rate (a sample size of 700). It provided a significant understanding about that community's culture, needs and understanding of risk and warning information. The findings from this phase of the community consultation strategy have been supported by the follow-up one-on-one interviews and discussions with local organisations such as child care centres, schools, and local businesses.

Overall the community consultation strategy designed for the Coode Island project aimed to set up structures that would allow for continuous two-way dialogue between the community members and the stakeholders. This was achieved with a field worker being contracted to regularly meet with community groups and organisations such as child care centres and aged care facilities, undertaking a number of one-on-one interviews with community residents and utilising the local government's processes of community participation. A strategy to engage with culturally diverse community groups was achieved through the development of dialogue and information presentation with adult students from Community English classes.

These strategies of community engagement and consultation were an initiative of the major hazard industries to set up site specific community consultation committees and produce and disseminate community/ industry newsletters.

The focus of the community consultation strategy has been to build a level of trust between the stakeholders and community, establish processes which would maintain opportunities to regularly link the industries, local government and emergencies with the community, and build the industry's understanding about the community's culture, needs and current knowledge and perceptions of risk and emergency warning and management procedures.

This broad approach to community consultation and engagement did not focus on the design of specific warning technology but on strengthening those principles that have been associated with effective

community warning systems. The process of community engagement has been time consuming and at times it has been difficult to measure its tangible effectiveness. However the approach has defined and established the linkages between the principles of shared understanding, social trust, local context and formal and informal communication.

The links between community warning systems and community culture

The case study description of community warning systems confirms the localised impact of the hazard and subsequently the role of the community warning procedures. The review of the 2001 Kempsey flood found that various types of warning messages were delivered depending on the timing of the flood the differing needs of both the residential and business communities and the available resources. (NHRC 2002)

The IDNDR statement of guiding principles for effective early warning consistently acknowledged the value of local involvement and local knowledge in the planning of community warning systems. (1997). Knowledge of a community's culture however presents the development of a community warning system with more than just emergency risk management information. Community culture is a rich tapestry of social networks, norms, customs and informal and formal information channels. The utilisation of this knowledge can significantly assist the incorporation of community warning principles into an integrated system. The dilemma for the emergency management sector has been the elusiveness of processes that would enable access into a community's culture and a long-held view that this type of information has not been required in the domain of emergency management or community warning

The community consultation process provides an opportunity to discover the social networks and dynamics of a community. In both the Ferny Creek and Coode Island projects, the use of detailed questionnaires, which explored the resident's sense of place within the community, was as important as the residents' perception of risk and emergency preparedness. The Ferny Creek project included this approach as part of the evaluation whereas this approach was a major component of the community consultation phase within the Coode Island project.

Using face-to-face interviews, focus group discussions and exploratory meetings with local community organisations were research tools which enabled quality information to be accessed.

The follow-up evaluation of the Ferny Creek Fire Alert Siren, conducted in 2002 involved the direct interviewing of residents. The results of this particular process has identified that women and children seem to actively take on the responsibility to practice bushfire preparedness and response actions and it was discovered that as a group they were more likely to be at home during the day when it was probable that bushfire incidents could occur.

The discussion with some residents also identified the ways in which new residents to the area accessed information about the community and about bushfire survival planning, the responsibilities which residents had toward their pets—(this was a factor which influenced some of the residents decisions to 'stay or go') and the way in which the residents in this community communicated with neighbours, family and authorities. This information will be incorporated into the continuing development of the bushfire survival community education campaign in the Shire of Yarra Ranges and provides further knowledge to enable the Ferny Creek fire alert siren to remain relevant to the lives of the residents within this community.

The community consultation process of the Coode Island project discovered the connection of residents to the local shopping areas (particularly Yarraville Village) and the community safety role that 'good neighbours' provided to residents. The exploration discovered that almost half of the residents within a community area were out of their area during the day and that many of these residents had children who attended local schools. In an emergency this particular group of residents stated that their first priority would be to ensure the wellbeing of their children. Imagine the number of telephone calls that local schools could receive if an emergency occurred!

The Coode Island Project has extended its understanding of community culture through the engagement of culturally and linguistically diverse community groups and the identification of 'vulnerable groups' such as aged care facilities. Recently the development of Geo Information Spatial maps have recorded elements of formal and informal information networks operating within the community thereby assisting the industries and local government with their decisions about emergency management, community education and community warning procedures.

The tools analysing community culture and linking these cultural elements with community warning principles have become a social mapping process. Social mapping is able to describe the demographics of a community and has the potential to explore the role, power structures and dynamics of networks within a community. It can enable detail to be collected about formal and informal communication processes and explore the community's history. The technique of social mapping is currently being explored as a mechanism to understand the social capital of communities (Stone 2001) and at this early stage it seems to be supporting the exploration of community warning principles and subsequently the design of a warning system which is responsive to community needs and interests.

The links (and conflicts) between stakeholder policies, community needs and community warning systems

Handmer (2001) identified that warning systems appeared to fail when there was a neglect to establish a shared meaning and co-operation between the different groups. He indicated that the communication between the groups should be about negotiation.

The results of both the Ferny Creek Fire Alert Siren evaluation and the Coode Island Project indicated that the communication processes were more than the establishment of interpersonal goodwill and commitment between personnel representing the different organisations. It was about reconciling the policy differences and expectations of the stakeholder organisations.

The Ferny Creek Fire Alert Siren Project had a turbulent beginning with the highlighting of a fundamental policy difference between the key stakeholders. The CFA's focus on bushfire survival relied on residents developing preparedness plans and making a choice to either stay and defend their home during a bushfire or to leave their home early—preferably make a decision to be away from their home on days of total fire ban. This strategy was introduced to avoid a situation of unsafe residential evacuation and to consider the rapid onset impact of a bushfire.

This approach to bushfire survival did not include a response to a fire alert system that CFA believed could increase the possibility of unsafe evacuation during a fire. The Police involved in the Ferny Creek project, believed that a community based warning system would have no bearing on their decisions to warn and inform the community about bushfire survival. The Police's role to provide the community with warning communication and to coordinate public evacuation operations is incorporated within Victoria's State Emergency Response Plan. The local government's focus was to support the needs of residents in the Ferny Creek area.

Residents living in this specific location of Ferny Creek were not able to hear the local CFA brigade siren during the 1997 bushfires and radio reception was identified by residents as being extremely poor in certain locations of this community. The residents believed that without some form of warning system, they would again be vulnerable to bushfire.

The opposing positions between the CFA, Police and local government and residents prompted the members of the working group to find some other common ground which would enable them to undertake this Project. The working group members agreed to the development of a fire alert siren being a trial and the group made a commitment to put aside their organisations' policy positions and to work on the

A communication chain operates across and between organisations and communities

process of working together. One resident commented that this presented *'a melting pot of ideas'*. (Betts 2001). The group's agreement to a community communication strategy (including community education) and to the promotion of the fire alert siren as only one component of bushfire survival diminished the influence of the basic differences between the groups. However it remains to be seen if interpersonal cooperation and negotiation is sufficient to support the success of the fire alert siren's operation or if organisational policy will override the best intentions of inter-agency cooperation.

The influence of conflict between organisation and stakeholder policy has been a consideration when planning a process to achieve inter-organisation cooperation for the Coode Island Community Warning and Information System project. The project's initial planning phase involved an assessment of 'policy and priority positions' for the industry's, emergency services (MFB and Vic Police), government departments, local government and for the various community consultative and action groups.

The establishment of 'shared meaning' and cooperation required more than inter-personal dialogue and negotiation. The partnerships and shared meanings have only been achieved through consistent opportunities for debate between groups (the industry forums provided this opportunity) and the identification of opportunities for consultative communication, joint activities and shared information. There appears to have been value in the project's initial focus being on the needs and interests of the community rather than focusing on a 'warning technology' solution being discovered. Conflict and opinion differences have been openly tackled allowing for the development of policy compromise as well as inter-agency cooperation and goodwill.

The links between the 'chain of communication' and community warning procedures

The existence of both official and unofficial warnings and the acknowledgments of detection, monitoring and forecasting procedures between emergency agencies confirm the presence of a communication chain that operates across and between organisations and communities. The disconnection and fragmentation between these communication networks (Handmer and Parker 1998) however suggests that a communication chain, which supports the management of an emergency, is very rarely free of gaps and breakages.

The concept of a 'communication chain' and the links which join these concepts have been described as the combination of official and unofficial warning systems but to date there has been insufficient exploration of this communication chain to define the processes and assumptions which underpin it.

The evaluation of the Ferny Creek Fire Alert Siren identified the existence of official and unofficial sources of information for the community, some of which were warning messages and others that provided a continuing source of information throughout the emergency. During an emergency, residents reported that they would access neighbours, scanners, radio, TV, direct communication with emergency services and personal judgements as information sources. The fire alert siren has become another added source of information, not an end in itself.

The emergency services and the local government also had their own communication procedures that were used, within their own organisation and across organisations. The evaluation findings however have identified that currently these chains of communication suggest limited understanding about the information needs of specific groups and each of the emergency service's communication protocols don't as yet seem to incorporate the warning and information needs of the community.

The initial evaluation identified that during its first season of operation, the Ferny Creek Fire Alert Siren was not operating as part of an integrated emergency communications system. The working group acknowledged this finding, and has since conducted an exercise to explore the chain of communication that would occur if the area experienced another bushfire. This exercise has confirmed the presence of official and unofficial warning communication processes. It has also noted that access to relevant information from these sources could be unpredictable depending on the resident's knowledge of bushfire preparedness and planning and their connection to the local community. The fire alert siren is a trigger to not only seek further information but also to implement whatever plans or actions the residents may make in emergency situations. In an extreme situation, there may not be sufficient time to access further information. The residents reported that in a bushfire they become totally reliant on major media reports as a source of continuous information throughout an emergency and this source of information relied on the emergency services' recognition of the community's needs and their ability to transfer the necessary information from the fireground, to the police and then to the media.

The importance of providing warning and ongoing information ('real time' information) to the community needs to be valued in a similar way by all the stakeholders, including industry, emergency services and local government.

The continuing work being conducted on this chain of communication will identify the communication role of local government, the communication processes between the fire service and police, the links with other emergency services such as the SES and the protocols that determine how the major media report the emergency. This exercise challenges the meaning of communication effectiveness in emergency management. The focus of communications is often solely on the management of the emergency either within or between specific emergency services. The operation of community based warning and information systems will continue to challenge this focus.

The transfer of information outside of this circle from the emergency services to the community, local government and media often appears to be a much lower priority. The community residents' hunt for accurate and relevant information to reinforce their decisions to act can then become a frustrating process.

The stakeholders involved in the Coode Island Community Warning and Information System Project have also recently undertaken a similar exercise. This exercise is not complete and it has initially revealed a number of questions and issues that need to be resolved by the stakeholders. These include:

- Who has the responsibility to deliver warning and continuous information to a specific community and to the organisations within that community? Is it only the responsibility of the Police or does industry also share that responsibility?
- In a major incident the issue of timing is critical to the response of the emergency services, the assessment of the emergency and the delivery of information to other stakeholders (other industries, local government etc) and to the community. Can the implementation of the current communication procedures be timely and how can they be improved to improve their efficiency?
- The importance of providing warning and ongoing information ('real time' information) to the community needs to be valued in a similar way by all the stakeholders, including industry, emergency services and local government.

- An effective emergency communication system needs to ensure that its communication processes to the community are inclusive, responding to the information needs of culturally diverse communities and individuals.

The 'chain of communication' supporting an emergency community warning and information system needs to have agreed values between stakeholders about the importance of the communication process as well as the focus of the communication messages. It relies on congruence between the emergency response communication of the emergency services and the information delivered to the community. It is vital that the local government establishes its role and responsibilities within these processes. The communication chain is not however a linear set of procedures which operates sequentially but it is a system of communication processes which are all inextricably linked to each other and which culminate in an effective management of the emergency and the demonstration of a safe, informed and confident community.

Conclusion

The Ferny Creek Fire Alert Siren has provided a unique opportunity to extend the previously limited descriptions and analysis of community warning and information systems. The evaluation methodology allowed for Handmer's principles of effective warning systems to be critically analysed and further developed. The Ferny Creek project identified the development of a process which established a working group which had equal status between all stakeholders including the community but which also demonstrated the complexities involved in the engagement of the broader community and the development of a truly integrated system of warning and ongoing information communication. The project strongly suggested in its evaluation that an integrated system of community warning and information relied on 'linkages' between the core principles and operational procedures. These linkages were introduced by Handmer (2001) and Handmer and Parker (1998) but the lack of community warning system evaluation in Australia has meant that the linkages have not been sufficiently defined or explored until now.

The Ferny Creek project was the first case study to commence this process and the opportunities gained from this project and used within the work being undertaken at Coode Island has enabled this exploration to continue.

The linkages have been defined as the communication and partnerships processes between stakeholders—the debate to establish shared values and trust, and acknowledging the influence of culture and context for both the represented organisations (emergency services) and the community. This is a continuing issue for both projects and the processes to achieve these outcomes will probably continue to evolve. The linkages assist the establishment of a 'bottom-up' approach to warning system design where there is a focus on the needs and interests of the community rather than just on technological solutions.

The challenge has been to work within the framework of principles and linkages to establish a practical process through which to develop and implement a community warning and information communication system. This paper has discussed two important case studies which have provided a significant step to meeting this challenge.

Bibliography

Betts, R. (2001) *Ferny Creek Fire Alert Siren Evaluation Report.* The Office of the Emergency Services Commissioner, Victorian State Government.

Bishop, P and Davis, G. (2002). Mapping Public Participation in Policy Choices. *Australian Journal of Public Administration, 61(1): 14–29, March.*

Esplin, B. (2001). Unpublished Presentation on *Community Participation and Emergency Management,* The Office of the Emergency Services Commissioner.Victoria

Handmer, J (2001). Are Flood Warnings Futile? Risk communication in emergencies. *The Australasian Journal of Disaster and Trauma Studies.* Volume: 2000–2 New Zealand

International Decade for Natural Disaster Reduction (IDNDR). (1997). *Guiding Principles for Effective Early Warning.* Emergency Management Australia, Australia.

King, D. (2002). *Understanding the Message: Social and Economic Impacts of Weather Generated Natural Hazards.* Invited paper, Presented to AMOS Conference, University of Melbourne Feb 2002

Parker, D (1999). Criteria for Evaluating the Condition of a Tropical Cyclone Warning System. *Disasters,* 23(3), 193–216, U.S.A.

Parker, D and Handmer, J. (1998). The Role of Unofficial Flood Warning Systems. *Journal of Contingencies and Crisis Management.,* Vol.6 Number 1, March 1998. U.S.A.

Risk Frontiers – NHRC. (2002). The Business of Warning. Article from *Risk Frontiers quarterly newsletter*, March 2002, Volume 1, Issue 3. Macquarie University N.S.W.

Stone, W (2001). *Measuring Social Capital, Towards a theoretically informed measurements framework for researching social capital in family and community life.* Research Paper 24, Australian Institute of Family Studies, Commonwealth of Australia.

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