Warning People About Coming Floods: Recent Developments and Some Barriers to Improved Performance

Chas Keys, Deputy Director General
New South Wales State Emergency Service

Abstract

This paper examines the role of the State Emergency Service in providing warnings of coming floods. It deals with the history of that role, noting the ways in which current practices have evolved and documenting the means by which the SES has sought to add value to Bureau of Meteorology flood warnings and ensure that warning messages are disseminated effectively. It also focuses on the existence of barriers which impede success in the pursuit of high standards of warning. These include the fact that floods occur relatively infrequently on most of the state’s rivers, which means that SES personnel get little practice in the warning role and members of flood liable communities do not become accustomed to the flood threat or to the need to heed the warnings they receive. Mindsets both within the SES and in the community can also act as barriers to improved standards, and some examples of these are discussed as are the SES’s attempts to confront them.

Introduction

It is often said that flooding is the most manageable natural hazard which communities have to contend with. And so it is, by comparison with bush fires, storms, earthquakes, droughts, landslides and most of the other perils which periodically assail humanity, but flooding is not automatically or naturally manageable. Rather, manageable has to be achieved, and the tools for achieving it must be consciously built and applied. The tools have to do with such things as the development of appropriate mitigation devices, the nurturing of quality response capabilities, the promotion of flood comprehension among the members of flood prone communities, and ensuring that people have sufficient opportunity and time to act in the interests of their own safety and to protect their property as floods approach. All of these tools have been developed and used in NSW in agency and community efforts to reduce the undesirable consequences of flooding.

The last element is particularly important. It relates to the provision of warnings – that is, the notification before floods arise that they are coming and the accurate estimation of how severe they are likely to be. This paper examines the evolution of flood warning practices in NSW, seeks to assess their current effectiveness and identifies some of the problems which those responsible for warning flood prone communities have to face in carrying out the warning task. In doing so the paper focuses not on flood prediction as undertaken by the official flood forecaster, the Bureau of Meteorology, which provides height-time forecasts for more than 160 sites on the state’s main rivers, but on the communication of these forecasts to the people who need to hear, understand and act upon them. In essence this means examining how the SES, whose enabling Act of Parliament requires that it warn people about coming floods, performs its warning role.
A Short History of Flood Warning

The SES has been involved in flood warning and response tasks for the whole of its nearly 50 years of existence in this state. The organisation was born, literally, of the flooding which devastated much of NSW during the middle years of the 1950s when many areas experienced record and near-record floods with terrible consequences in terms of loss of life and damage to private property and public infrastructure. During its early years the SES absorbed the previously-existing local flood warning initiatives in which flood height readings were passed down the state’s rivers and communicated to floodplain residents, and gradually too it absorbed the Water Brigades which had grown up in many of the coastal valleys for the purpose of facilitating community flood responses. For many years in some areas, the Water Brigades had resupplied people whose road access had been cut by flood waters, rescued people at risk of drowning, guided farm livestock to safety, and provided information about flood waters which were still to arrive from upstream (Lewis-Hughes, 1998).

In effect the SES inherited the community warning and response initiatives which already existed. These were generally simple and informal in nature, reflecting local needs, resourcefulness and expertise. Local warning systems operated cooperatively as a result of the activities of farmers (the creek and river readers), postmasters (who controlled the telegraph and telephone transmission of information from upstream locations), police (who in the more severe events sometimes organised doorknocks in the low-lying parts of towns facing inundation), and council engineers (who sought to determine from upstream heights the areas of likely inundation and helped with the dissemination of warnings to farmers and townspeople in the areas at risk). As regional radio stations developed from the 1920s another, highly penetrative means of disseminating information on approaching floods became available. In at least one instance, in fact – the case of 2VM (Voice of Moree) – the regional radio station was founded as a result of the recognition in the state’s north-west that local warning and other flood information could not be appropriately disseminated without such a facility.

Also as the twentieth century unfolded, public weather forecasting evolved and eventually spawned specialist services including flood forecasting (see McKay, 2002). Networks of rain and river gauges were established and hydrologic modelling was employed to produce first qualitative and later quantitative forecasts of the flood levels which would be reached over the next few hours or days on specified river reaches or at nominated gauges. In due course the gauge networks were augmented and data transmission was telemetred, freeing the forecasting system to some degree from its reliance on local stream gauge readers. Meanwhile formal, cooperative agreements were developed between gauge-owning organisations to facilitate the exchange of hydrological data, and between the Bureau, the SES and radio stations to govern the transmission of warnings to the radio stations and their broadcast to communities threatened by flood waters. The predictions themselves took on standard formats dictated by agreed definitions and procedures laid down in formal flood warning plans which set out the responsibilities of the various players involved. In the formation of these technocratically and procedurally-oriented systems, many of the old community self-help systems declined to the point of virtual disappearance as the new ones took over their function (Brown, 1986, 64). Rural depopulation, farm enlargement and the weakening of social networks in rural areas intensified the trend, as did gauge automation and the development of telephone and radio telemetry. Flood warning systems became more scientifically and procedurally driven and less dependent on local enthusiasm and input for their operation.

By about 1970 the main players in the operation of flood warning systems were the Bureau of Meteorology (the official forecasting agency), the state’s water and flood mitigation
agencies (the predecessors of the former Department of Land and Water Conservation), the SES and the radio stations. High standards of practice were achieved in some elements of the flood warning systems which evolved. An example can be found in the steady improvement in warning accuracy achieved by the Bureau of Meteorology in NSW. Between 1983 and 2002 the proportion of the flood height forecasts issued by the Bureau which proved to be accurate to within ± 0.3 metres increased from 50 per cent to 80 per cent (Robinson and McKay, 2002). Likewise, ‘flood watches’ (Bureau products issued in advance of flood-producing rains but indicating a potential for them to occur) are much more likely to herald floods nowadays than they used to be: the ‘false alarm rate’ has fallen substantially in recent years.

In terms of effective performance, flood prediction is clearly improving. That being so it is fair to ask whether other components of the flood warning system are doing the same thing – in particular those components which relate to the dissemination of flood warning information and the promotion of actions which help keep people safe, limit the avoidable damage attributable to flooding, and contribute to the maintenance of normal community functioning when flooding occurs. Precise measures of effectiveness are less easy to devise in these areas than in the case of quantitative forecasts of flood height and the advance assessment of when specified heights will be reached. Nevertheless some appraisals can be made – for example by examining how well people react when advised of approaching floods and by evaluating progress in the performance of organisations like the SES in providing warning information to those who should be able to benefit from it. How well the SES performs its role in relation to the warning task is a matter, largely, of its ability to add value to Bureau forecasts in ways that help people to respond effectively. In turn, this is a matter of SES mindsets in relation to the definition of the warning task and of its success in gathering the information which it provides to help people understand a coming flood and to act appropriately in their own interests to manage it.

**The SES Role in Flood Warning**

Let us examine, first of all, the quality of the SES’s flood warning practices during the late 1980s and early 1990s. During that period there was serious flooding in several parts of the state both east of the Great Dividing Range and in inland areas. There was also serious flooding in Queensland and Victoria, and to capture the lessons learned in these various events two national workshops were held at the Australian Counter Disaster College (now the Emergency Management Australia Institute) in 1990 and 1991.

These workshops made it clear that flood warning practice in Australia was somewhat unbalanced in its focus. In particular, much attention and investment was being given to the technical issues relating to flood prediction, with considerably less being paid to the ways in which these predictions were being used to inform responses in the public arena (see Keys, 1992; Elliott et al, 2003). It was apparent that flood prediction systems were much more sophisticated than dissemination systems which were in some cases sending out little information apart from the predictions themselves and were often not motivating appropriate protective behaviour on the part of community members. The second of the two workshops called for the production of a national guide to define best practice in flood warning which would help agencies like the SES to better conceptualise their task and to develop the tools to carry it out. The guide was published a few years later (Emergency Management Australia, 1995) and reissued with substantial revisions four years further on (Emergency Management Australia, 1999).

These documents indicated strongly that improvements in the quality and effectiveness of flood warning systems required changes in the way flood predictions were utilised. In many
cases, height-time predictions were being disseminated via radio stations without efforts being made to ensure that they communicated the real meaning of an approaching flood to the communities in its path. Messages sent to radio stations for broadcast also tended to lack specific information on what people should actually do to stay safe, protect belongings and adjust their lives to the circumstances of the flood (for example, by altering their travel behaviours). In the worst cases, what was sent to the radio stations was the bald prediction that River A would reach height B at gauge C at D o’clock: there was no information added on what the effects of the flooding at the forecast height would be, who would be affected and in what ways, and how people should respond (for example, by stocking up on food and other essentials before isolation occurred, lifting or moving items of property, avoiding roads which were likely to be cut, or evacuating by a specified route to a nominated place of reception). Yet without this information, the predictions were likely not to be understood by many people: gauge heights, on their own, are comprehended only by a minority. In many instances, though, the prediction was the whole warning. No value was added to it, and the SES acted solely as a postbox in transmitting the prediction to the radio station.

Moreover, warning communication was largely confined to radio stations, even though in some locations reception was poor, and in rural areas to telephone trees. Doorknocking strategies and public address systems were used infrequently and haphazardly even in the larger floods when large-scale evacuation was likely to be necessary. There was little appreciation of the need to use a range of warning methods, layered upon each other, to maximise the likelihood that the message would get through and to ensure its reinforcement in the minds of those who needed to act upon it.

It can be argued that the SES of about 15 years ago was not as clearly focused on the flood warning task as it should have been and had not developed the tools to allow it to contribute fully to the operation of high-quality flood warning systems. Little flood intelligence – that is, information about the consequences of flooding on nominated river reaches at particular gauge heights – had been developed. As a result there was little information to add to flood predictions to demonstrate what actions people should take as rivers rose to forecast levels. Likewise there was no consistent planning for the warning task in the context of determining in advance which warning methods should be employed in which environments for which levels of forecast flood severity.

In 1988 the SES was subjected to a review which noted its relative weakness in the flood planning area (Premier’s Department, NSW, 1988). The strong implication was that the organisation needed to do much more to become genuinely expert in the management of the flood hazard, to prepare more actively for it and to perform more effectively in this vital aspect of its core business. Deficiencies in warning practices were not specifically mentioned, but the conclusion that the SES’s planning responsibilities had been neglected can be taken to suggest that planning to deliver flood warnings was not being approached as it should have been.

Towards Improvement, 1990-2004

The SES reacted in a number of ways to the Premier’s Department review and to the later publication of the best-practice guides on flood warning. In 1990 it employed a Planning and Research Officer whose principal purpose was to gather flood intelligence which would be of use in real-time decision making and in making flood warning messages more useful and more able to be understood. There are now three such officers employed at the SES’s State Headquarters, collecting intelligence during and immediately after floods and from the now large numbers of very valuable floodplain management studies conducted for councils.
around the state. The ‘bank’ of intelligence they and the SES’s volunteers have compiled is voluminous, recorded in formal databases and of much higher quality than what existed a decade or more ago. These officers also coach SES volunteers in collecting flood information and help them to use it in the development of flood plans which act as ‘records of intended proceedings’ for carrying out the warning and other tasks which must undertaken when flooding occurs. While the flood intelligence is by no means complete, especially in terms of consequences at the higher levels of flooding which are experienced only rarely, it is growing in volume and refinement and it is certainly capable of informing flood warning messages and helping the organisation to devise better warning strategies.

Beyond gathering data to include in warning messages to make them more meaningful, the SES has been involved in assessments of the merits of a range of technologies of potential use in the communication of flood warnings (Molino et al, 2002a, 2002b). These days there is a growing array of devices which can be used, some of them technically highly sophisticated, and in the near future we can expect an increasing utilisation of them. The SES has also sought to evaluate the impact, or lack of impact, of its flood warning initiatives. A study of an evacuation operation conducted in Grafton in March 2001 as a near-record flood rose towards the top of the town’s levees found that most of the residents heard the evacuation warnings but that for a variety of reasons only a few heeded the call to leave (Pfister, 2002). This study is one of several over many years to have demonstrated that warnings often fail to generate the responses sought by those who issue them (see also Handmer, 1988 and Gissing, 2002). Clearly, more effort is needed to make sure that warnings are clearly expressed, persuasive and provide the necessary information on which people can base their evacuation or other responses. At what might be called the psychological level, there is much to learn before warnings become truly effective in motivating appropriate actions from those who are about to be affected by flooding.

One area on which the SES has focused considerable attention over the past two or three years, specifically for the purpose of generating stronger responses from community members, relates to the formulation of warning messages outside of flood time. Examinations of the warning messages sent to radio stations during the floods of the 1990s and 2000-01 revealed that they contained many weaknesses which were in part the result of hasty compilation. With many management tasks competing for attention – the organisation of resupply, sandbagging, evacuation and other operations among them – the construction of warning messages was not being given the attention it demanded and quality suffered accordingly. Necessary information was inadvertently left out, factual errors crept in, the expression was sometimes confusing, and the appropriate psychological notes so important to the creation of the needed responses were not struck. Recognising these weaknesses, the SES has embarked upon a project to create ‘pre-written’ flood warning messages for a range of flood heights for the river reaches ‘served’ by all the gauges for which the Bureau of Meteorology issues flood predictions. These messages, which are to be modified in the real time of an actual flood so that current information can be included, should considerably increase the speed of release of warning information and improve the completeness, meaningfulness and accuracy of message content. Before long there will be literally hundreds of these messages written and ready to be vetted and modified for real-time release to add value to Bureau predictions. No message going to radio stations will be confined in its content to the Bureau’s product: all will say something about the likely consequences of flooding at the forecast height in terms of areas inundated and roads closed and will suggest what people should do to manage these consequences, stay safe, and protect belongings. They will also provide information in a geographically explicit context, so that people in an area will know that a warning message relates to them.
Another initiative of recent times relates to the planning of warning delivery by means of choice of dissemination techniques. Flood plans being prepared by the SES now seek to define clearly the warning methods which will be employed for differing levels of forecast severity, and to do so in sufficient detail to guide local responders to use them effectively. Thus the circumstances and timing of activation of contacts – for example by telephone tree, automated telephone dial-out, faxstream, email, public address system, two-way radio, doorknock and even newspaper where appropriate – will be specified in plans as will the clients for the different delivery systems.

A particular instance of this work relates to the planning of doorknock operations: the SES has found that when not fully planned these tend to be conducted haphazardly. Often they are begun too late, miss some people who need to be contacted, fail to provide all the needed information, or fail to take full advantage of the opportunity to gather operationally-useful data (for example, the locations of people needing special help). Guidelines on doorknocking, based partly on real flood experiences (such as at Kempsey and Grafton in March 2001), partly on exercises conducted in the valley of the Hawkesbury River and partly on the SES’s experience in providing information door-to-door during bush fire support operations in recent severe fire seasons, have been devised. These should increase the effectiveness of information provision on a face-to-face basis, especially in the circumstances where serious floods, likely to require evacuation, are approaching.

It is one thing to devise initiatives like these, but for them to take root requires a commitment of resources and an appropriate mindset throughout the organisation to ensure they are properly implemented. The SES was fully involved in the development of the warning manuals noted above, and its staff have conducted numerous briefings of other staff and volunteers to define standards and convince front-line flood managers and practitioners to accept and adopt best-practice methods. The organisation has embarked on a stronger exercising regime than in the past, too, and in the absence of actual flood experience this will generate further opportunities to demonstrate the need for reforms to traditional practices in the flood warning field.

**Barriers to Success**

Attempting to remedy identified deficiencies in current practice is not guaranteed to succeed, of course, because there are barriers to the implementation of the needed reforms. One of the most significant barriers in the context of flood warning effectiveness is the fact that flooding, while highly predictable, occurs relatively infrequently at the local level in this state and not according to clear seasonal rhythms. This means that there are few opportunities for SES volunteers and staff at local and regional levels to learn the best techniques of warning and to use flood-management experience to turn weaknesses of practice into strengths. Individual rivers in NSW frequently go several years without flooding – the Murray River below Hume Dam, the whole of the Murrumbidgee River, the rivers of the south coast and the Georges and Nepean-Hawkesbury rivers are cases in point at present. These rivers have seen little or no flooding for more than ten years. Indeed, several decades can separate genuinely severe events requiring complex responses including the utilisation of several warning devices simultaneously and evacuating very large numbers of people. As a result of the infrequency of flooding most SES volunteers, like other members of the communities in which they live, have had no experience of managing genuinely severely flood events. Many, have in fact, had no first-hand experience of flood management at all.

In this situation a number of undesirable consequences follow. Foremost among them is the problem that the SES’s front-line managers have no practical opportunity to develop and
maintain their expertise. Even worse, the absence of flooding for long periods may tend to reduce their incentive to do so. The risk is that their focus will drift to others of the organisation’s roles which appear to be more relevant and more worthy of attention because they must be addressed more frequently. Storm damage management and road crash rescue activities are examples. And when floods do occur, the focus tends to be on activities which are perhaps simpler to organise and carry out than is the warning task – supplying people who have been cut off, or building sandbag walls, are cases in point. These action-oriented functions, the benefits of which are easily appreciated, are perhaps more readily perceived by responders to be important. Warning initiatives, in fact, may be under-rated and under-appreciated in hands-on responder cultures which prize physical action over ‘management’ and do not necessarily see warning initiatives as being of high priority.

This goes to questions of mindset. Lack of practice in flood management, and a belief that functions other than warning are more worthy of attention, militate against the achievement of high standards of warning practice. Some SES personnel may in fact resist modern conceptualisations about what constitutes appropriate standards: cases are known of volunteers rejecting Bureau of Meteorology flood predictions in favour of making their own based solely on upstream gauge readings and advice from landholders. This is dangerously backward looking since it implies a rejection of science and an over-reliance on local knowledge and lore which will sometimes be based only on the memory of events which occurred many years ago. Some SES members, too, have been reluctant to utilise flood intelligence to advise people as to what might occur as a flood rises. In such cases the concern relates to a lack of confidence in the available flood intelligence, a fear of being attacked if consequences are not accurately foreseen, and especially a fear that the Bureau’s forecast might turn out not to be matched by the flood itself. Understandably, SES personnel are worried about being seen in their communities as being ignorant about the effects of a coming flood or as having reacted to consequences which hindsight shows did not occur. The fear of ‘crying wolf’ or being accused of ‘scaremongering’ runs deep and causes some to resist the stricture, which SES State Headquarters pushes firmly, to add value to height-time predictions by estimating from intelligence records what the impacts of the flood will be at the height forecast by the Bureau.

This fear is not unreasonable, and it affects local SES volunteers and regional staff alike. The problem can be intensified by community feedback which has the effect of discouraging the SES from high-quality warning practice. Negative comments from residents, and indeed from local government councillors, can cause difficulties. On the mid-north coast in May and June 2003, the SES sought to publicise via local radio stations two separate Bureau flood watches – that is, notices of potential flooding well in advance (and indeed before significant rain had fallen). As sometimes happens the flooding did not eventuate, and one SES Unit Controller was subjected to personal criticism both to his face and in the local newspaper for having allegedly over-reacted. Another controller in the same region reported that a local radio station had been reluctant to broadcast an SES message based on one of these flood watches on the grounds, presumably, that the flooding had not begun and might not do so. This is problematic given the fact that many of the smaller valleys along the coast experience flooding which occurs quite soon after the rain has fallen: in some of these cases the flood watch may be the only indication to the public that flooding may occur. Not to utilise it may mean providing no meaningful warning at all.

There are more cases of this sort of thing happening than is usually recognised, and some of them have emanated from council sources. During one recent flood a councillor was critical that the SES had indicated in a Flood Bulletin, which was read over local radio stations, that at the flood height forecast by the Bureau the main bridge within the town would be closed.
The councillor’s concern, apparently, was that announcing this would have negative commercial consequences – which begs the question about just what the warnings should say about potential consequences which in some cases will turn out not to occur. Prediction and forecasting by their nature involve uncertainty, and in the case noted the flood did not reach the expected level and the bridge did not have to be closed. The SES does not believe, however, that this occurrence made invalid the message which was sent to the radio stations: to argue otherwise is tantamount to saying that warnings should not estimate consequences and advise the community of them. The potential for small errors must be tolerated, just as it must be for Bureau predictions. The fact that the feared commercial consequence did not occur in this instance should have been regarded as a bonus. It should certainly not be taken as a reason for criticising a stance which reflects appropriate practice devised to help people understand the likely – not certain – implications of rising floods.

This same flood may have seen the council resisting SES efforts to inform visitors who were camped on a floodplain that a flood watch had been issued for an area which included the local river. The SES proposed to advise the campers individually using a simple safety message – not an evacuation request – but there was opposition which appeared to be based on concerns that publicity given to possible flooding would discourage additional people from coming to the town. As it happened a flood did develop, and very speedily by comparison with most other floods in the area in the past, and a large number of people who had been unable to prepare had to be evacuated under conditions of some danger. Some lost belongings, and it is fortunate that there were no deaths recorded. It should be noted in this context that people readily accept the evacuation of campers in danger of being caught in bush fires but the same attitude is not always is in evidence in the context of impending flooding. In a similar vein, nobody would argue that the airline safety messages heard on all commercial flights in Australia have the effect of scaring people or discouraging them from flying.

Recent coronial reports and special inquiries have suggested that high standards of information provision and warning – probably higher than in the past – are expected these days. In reporting on his investigations into the deaths which occurred during the Sydney-Hobart Yacht Race in December 1998, the NSW State Coroner was critical of various aspects of the communication of information on the state of the weather ahead of the fleet in Bass Strait. He was critical of the Bureau of Meteorology for not being sufficiently determined to ensure that the forecasts got to the Race Management Team, of the Team for not fully understanding the content and significance of the forecasts, and of the communication arrangements governing the passage of critical weather information to the fleet. In essence, inadequacies in the communication of weather information were found to have existed at various organisational levels and to have contributed to the tragedy (Abernethy, 2000, 124-28).

The inquiry into the January 2003 bush fires which devastated the western suburbs of Canberra drew similar conclusions. It found that the warnings issued by the ACT Emergency Services organisation lacked detail about what people should do and failed to motivate appropriate responses. On and before the day the fires struck Duffy and nearby areas, “the provision of information about the progress of the fires, the seriousness of the threat and the preparations the public should be making was seriously inadequate” (McLeod, 2003, iv-v). The enquiry into the Waterfall train disaster which occurred at about the same time was critical of the “pervasive lack of safety awareness within the management of the State Rail Authority” and suggested that the organisation had a “weak safety culture” (McInerney, 2004, 365 and 366).
There are consistent, clear messages in these pronouncements which the SES cannot ignore, and neither should councils. The messages indicate that a high standard is required of organisations which deal with potential danger and threats to life, and this flows into the warnings arena. In short we cannot fail to warn. We also cannot fail to warn clearly and with appropriate supporting information to justify the actions that are sought from those who could be in danger or who will have the opportunity to save belongings only if they are advised that they should do so. In its warning practices the SES is nevertheless sensitive to the potential impact of warnings on businesses. For that reason caravan parks, which depend on the tourist trade, are not mentioned by name in flood bulletins sent to radio stations. It is better for them to be advised of coming floods, individually and by the SES, by telephone.

Comments from members of the community make it clear that they expect to be warned of coming floods, and that they will be angry if they are not. Farmers, usually highly flood-aware and flood conscious, certainly hope to hear of coming floods from people other than their own contacts upstream. They will factor in the contents of a warning message contained in an SES Flood Bulletin heard over their local radio station or picked up from their fax machine, and they will make their decisions based on the message as well as on calls to upstream landholders and on checks of gauge heights recorded from past floods. One farmer in the north-west inland of the state, his land flooded without warning in February 2001, was instrumental in calling a public meeting at which he moved a vote of no-confidence in the SES and its warning procedures because he had received no advice. Another farmer, living on the mid-north coast, noted in a post-flood meeting in April 2001 that “the orange suits were no use to me” after she had unsuccessfully sought information on the timing of the next high tide. The SES, apparently, had not been able to provide the information she had wanted.

Such comments come from townspeople, too. After the February 2001 flood at Lismore some business people with properties in the CBD were critical that they had not been given appropriate advance notice of the flooding which occurred. Five years earlier, a caravan park owner on the lower Clarence had expressed the opinion to an SES officer that the organisation was “useless”, apparently because it had not notified him of coming flood which eventually inundated his park and damaged some of its vans (Opper and Rutledge, 1999). In this case, warning messages had been provided to local radio stations but there was no process to ensure that all businesses with interests on the floodplain received a telephone call to advise them of the potential flooding.

Of course, there are cases in which people react negatively to warnings when the SES believes they were very much warranted. In these instances people usually argue that the warnings were not necessary, and sometimes they have the benefit of hindsight which is not available at the response moment. In Coonamble in 1998, with strong evidence of a potential instance of levee failure, local SES members doorknocked houses in the low-lying areas of the town and were ridiculed in a letter to the local newspaper as a result (Opper and Rutledge, 1999). There are fewer cases of this mode of criticism, it should be said, than of criticism for a perceived failure to warn. Again it must be said that the fact that the levee did not fail – and the levee problem was almost certainly not known to the townspeople at the time – does not by itself invalidate the provision of the warning. Warning efforts must not be judged solely by hindsight, but by establishing standards relating to what was reasonable at the time. This is often not done in the flood warning context, unfortunately, and people sometimes jump too quickly to the conclusion that they have been warned unnecessarily. The SES, of course, has no reason to want to knock on people’s doors (and to do the organisational work behind such an activity) without believing there is sound justification for the intrusion.
It must also be recognised that, sometimes, people claim not to have been warned when in fact warnings were issued. Not everybody can expect a personal warning by phone or doorknock, especially in the lesser events, and it is not unreasonable for the SES to expect that people in flood prone areas will listen to their radios for warning information when rain is possible. These days, everybody knows about the existence of weather forecasts. What is more of a concern is the suggestion that warnings which were broadcast were not understood to be warnings, or were not understood by some people to be of relevance to them. This problem suggests that warnings sometimes lack clarity, or persuasiveness, or appropriate geographical relevance in terms of target. The SES is addressing this issue in the pre-written messages referred to above and by encouraging the development of telephone trees and direct telephone contact to people who may need to act.

The SES is also addressing the question of the fear of “crying wolf”. The Service is working to convince its Controllers that they should take note of flood watches and should ensure their broadcast by radio stations once the predicted rain event has begun or evidence has become available that creeks have risen. It is of interest that there is in some quarters a greater fear of providing information (because hindsight could indicate that it was unnecessary) than there is a fear of being criticised for not providing helpful information when there is reason to believe that flooding could occur. One wonders, too, how people who have discouraged the release of flood warning or flood educational information for ‘commercial’ reasons would be treated in post-flood coronial or other inquiries examining the performance of warning systems. The SES needs to be concerned about this, too, since it would not want to be guilty of failing to live up to its responsibilities in the flood warning context.

At the root of these problems, it must be said, is the pervasive complacency about flooding in the Australian community today. Almost certainly, it is not widely known that floods cost more in economic terms than do storms and bush fires (Bureau of Transport Economics, 2001, 35) or that they kill many more people than do these other perils (Coates, 1996). Fires are clearly much more feared than floods: everyone knows that even small fires can hurt and can become large and highly destructive if they are not appropriately treated, but small floods hurt only a few people and it seems that there is no clear understanding that floods can and will sometimes be large and severe. The difference in attitude, almost certainly, has a bearing on how warning messages for the two threats are treated. When, in February this year, Sydney was facing a week of daily high temperatures over 30°C the Commissioner of the Rural Fire Service was quoted on television as suggesting that the weather could cause fire problems in the Sydney basin. In effect a ‘fire watch’ was publicised, and there was no public reaction suggesting this was an over-reaction or a case of scaremongering. Nor was there subsequent comment about crying wolf when no serious fires eventuated. For the flood threat there is evidence of negative reactions to warnings if flooding does not eventuate or if it does not reach advertised levels, particularly if the SES has provided strong, informative messages and sought to empower people to deal with the likely threat. People are much more likely to react to the threat of fires than to the threat of floods and not to resist the warning messages from fire authorities. Perhaps the recent experience of a long El Niño episode, with successive severe fire seasons in 2001-02 and 2002-03 and a relative dearth of floods, has intensified a common mindset which accepts warnings of possible fires but rejects warnings of possible (even likely) floods.

One further barrier to the successful transmission of flood warning information should be noted. This is the question of the effectiveness of dissemination by broadcast radio during the era of ‘networking’ (in which local stations increasingly take programs from distant sources). Years ago, local radio was truly local and of the local community. In those days close working relationships were developed between regional-level emergency managers
and station staff and the broadcasting of warnings and supporting information was a relatively simple matter. Nowadays there are difficulties related to breaking in to external ‘feeds’, though it can and does sometimes happen with benefit to the promulgation of warning information. The SES fears, however, that the difficulties will at some stage compromise flood warning dissemination and it has lobbied to have mandatory requirements introduced to ensure that emergency messages are broadcast and in a timely fashion. The call was supported in a recent report (House of Representatives Standing Committee on Communications, Transport and the Arts, 2001, 119-20), but the committee’s recommendations on the matter have not been acted upon by the relevant federal minister. Commercial Radio Australia, the peak body representing commercial radio broadcasters, has adopted a Code of Conduct on the broadcasting of emergency information which it is hoped will preserve access for such broadcasting, but the SES remains concerned that such a code may not be strong enough to guarantee it. The SES is involved in a dialogue with Commercial Radio Australia about the code and has had discussions with the Australian Broadcasting Corporation as well on the broadcasting of flood warnings.

**Breaking Down the Barriers**

The problems alluded to above are not easy to solve, but there are ways of addressing them and reducing their impact. The SES is doing several things to break down the barriers to high-quality practice in the flood warning arena. It has recently embarked on a rigorous program of exercising its staff and volunteers, using realistic flood strategies and posing questions designed to challenge complacency and sharpen responses in relation to warning and other tasks. This will help volunteers to maintain their cognisance of the flood threat during the often long periods during which there is no actual flooding to manage. A formal course is also being compiled for SES members on the tasks and tools of flood management and this will place considerable emphasis on the warning role.

In the public arena, the SES is placing more emphasis than ever before on educating the members of flood liable communities about flooding and its management. These educational initiatives, which were addressed at length in last year’s conference of the Floodplain Management Authorities (Keys et al, 2003), recognise the need for people to understand the operation of the flood warning systems in their own areas. The education is about flood warnings, therefore, as well as about flooding as a hazard and how people can manage it: the critical link is the necessity for people to listen to and understand the warnings they receive and to utilise them in their own management of their circumstances as a flood approaches. The Georges River project referred to elsewhere in this conference (Gissing et al, 2004) should help us to develop a template for the link which will be useful in flood prone areas in other valleys.

**Conclusion**

The SES’s approach to its flood warning role has changed substantially in recent times. Fifteen years or more ago the SES’s participation in the provision of flood warnings was quite limited, perhaps to some degree even passive, but it became clear that higher standards were required in terms of the content of warning messages and in terms of dissemination. Since then the SES has sought ways of intensifying and extending its contribution to the flood warning effort and is actively engaged in a search for better practice. This has involved it in research about warning methods, in attempts to evaluate the performance of warning initiatives during periods of flooding, in efforts to strengthen its planning to warn of coming floods, in the education of its volunteers and staff so they can better apply the tools of flood warning in future events, and in seeking to overcome attitudinal barriers which work against sound flood warning practice being followed. If we are successful, flood warnings will be more helpful to people who live and work in flood liable
areas and will be more effective in assisting those people in their management of the floods which they periodically face.

References


The author acknowledges the helpful comments of Steve Opper, Andrew Gissing, Melanie Herbert, Philip McNamara and Dieter Gescke on the first draft of this paper.

**Paper presented at the 44th annual conference of the Floodplain Management Authorities of NSW, Coffs Harbour, 2004.**
Chas Keys has 14 years experience as an emergency manager with the SES. His speciality is in flood management, in which field he has written extensively in trade and other journals. He has also been a principal author of two national best-practice manuals, on flood warnings and flood preparedness, and he contributed to the 2001 edition of the NSW Floodplain Management Manual. He has attended almost all of the FMA's annual conferences since 1990 and this is the tenth paper he has presented to delegates. Previous contributions have been on flood intelligence, flood warning practices, the development of flood plans, the emergency dimension of floodplain management and the education of people in flood prone areas about the flood hazard and its management. He will retire in two months to flood liable Queensland where he hopes to undertake work as a consultant on flood management matters.