

MAKING FLOOD WARNINGS MORE EFFECTIVE: SES, COUNCIL AND COMMUNITY INPUT INTO THE DEVELOPMENT OF FLOOD WARNING SYSTEMS AND SERVICES

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“Sir – During the recent minor floods Coonamble was invaded in the middle of the night by an army of orange-suited Rambos, belting on doors and getting people out of bed with the advice to get dressed ready to be evacuated to the showground or racecourse when the sirens sounded.

Coonamble was at peace with this uneventful flood until the crowd tried to whip the locals into a frenzy and save us from a watery grave somewhere down the Barwon River. Our comments of what they could do and where they could go seemed only to increase their enthusiasm and efforts to save us from this tidal wave of unknown magnitude.

If someone had sounded a siren, we could have all been sitting around at the specified locations like a gathering of elderly tourists in Malaysia.

Thank goodness the flood and these demons of the night have now passed through. We could not have stood another week of that.”

This letter to the Editor of the Coonamble Times demonstrates the difficulty with trying to please everyone with a flood warning. In this case, part of the town levee had started to leak as the flood neared its peak in the very early hours of the morning. The Local Controller of the Coonamble State Emergency Service (SES) made arrangements to effect repairs to the levee as soon as the problem was identified. Also, he decided to warn the occupants of a nearby Retirement Village, occupied by aged and disabled citizens, of the possible need to be evacuated. There is no doubt that the Controller's actions were based on a reasonable assessment of the situation. The consequences may indeed have been severe and the levee could have failed. It would have been interesting to see the letters to the Editor if failure occurred and the residents had not received a warning. This incident shows that when it comes to warning the community of a possible or impending emergency it can be a case of “damned if you do and damned if you don't”.

On the 21st of August 1998, the SES's State Planning and Research Officer arrived at the Namoi Division SES Headquarters to commence field work with SES units and communities in the Namoi Valley. The aim of the trip was to review earlier work done on flood planning and public awareness as well as to take the opportunity to gather much needed flood intelligence. The trip was booked three months earlier. Upon his arrival, he was handed a Flood Alert that had been issued that morning. By coincidence he found himself on the ground at the start of the largest floods in the Namoi Valley for the past 14 years. He was about to experience first hand the benefits that good flood intelligence and planning bring to flood warning and the difficulties experienced where there is a lack of it.

This paper combines a discussion of some of the policy and principles which underpin good flood warning practice with observations and insights into the floods on the Namoi and Castlereagh Rivers which occurred in 1998.

In order to pursue the development of improved flood warning practice, it is first necessary to recognise **and accept** that change (improvement) is needed. Recognition of the need for change will only occur if the provider of the warning is in a position to be exposed to the results of poor warning. How many times have emergency services assumed that “everyone must have been OK or otherwise we would have heard from them!”? Maybe the truth is that many more people could have used a helping hand but in the end just accepted that “your organisation is !?#\$*?! useless mate” (residents comment after the Clarence River floods in 1997) and gave up without a fight.

If an organisation is preoccupied with its own narrow interpretation of what constitutes flood warning and does not expose itself to the community or other organisations for a quality control check, the gulf between best practice and the status quo will never be revealed. Organisations need to focus on the overall objective of flood warning rather than just on their own component (Handmer, Keys, Elliott, p4).

“A total flood warning system integrates flood prediction, the assessment of likely flood effects, the dissemination of warning information, the response of agencies and the public in the threatened community, and the review and improvement. These components must operate together for sound flood warning practice to be achieved” (Flood Warning an Australian Guide, p5)

Handmer, Keys and Elliott found (in 1998, p6) that while there was much literature about the theory of flood warning there was none on how to create practical systems on the ground. The translation of theory into practice requires that the flood problem in the target area is understood and documented. It is simply not possible to develop and implement a credible flood warning system without a thorough appreciation of how floods impact on the community. Without devaluing the work of the theorists, it is likely to be the case that it is much easier to develop the theory than it is to collect and interpret the data needed to design the total flood warning system.

The experience of some of us working to improve flood warning practice within the SES is that failure to adequately warn people (when measured against best practice) may not be the result of a lack of agreement with the principles of best practice. It is likely that one of the possible reasons is that the knowledge of the consequences of floods assumed to reside in the corporate memory does not exist, at least, not to the level of detail required to make confident estimates of the likely consequences of predicted flood heights. When faced with this uncertainty and the possibility of criticism for getting it wrong, the decision to limit the scope of flood warning, or to avoid it altogether, is too easy to make.

There appears to be a fear of getting it wrong or a belief that the issuing of the warning may cause unnecessary panic. By taking a quick look at an example from our military history we find that this thinking is nothing new. In mid 1942, the “impregnable” fortress of Singapore fell lock, stock and barrel into Japanese hands.

British and Australian service persons and many civilians were either killed or forced into captivity. There were many reasons for the fall of Singapore but it is worthwhile to focus on one area for a moment, that of taking precautionary defensive measures and warning the community. As the Japanese surged through Malaysia towards Singapore, Brigadier Simpson, the Chief Engineer, literally begged Major General Bennett (commanding the 8th Australian Division) to allow him to develop obstacles and defensive measures to slow the Japanese invaders down. His pleas fell on deaf ears until finally, in desperation, he inquired of his superior why he was so adamant about not wanting to take the defensive measures. At long last the General Officer Commanding Malaysia gave his answer. "I believe that defences of the sort you want to throw up are bad for the morale of troops and civilians"(Dixon).

The fact that this example from history is based in Malaysia is ironic when you compare it to the Coonamble newspaper article. The analogy of elderly tourists in Malaysia tourists is probably coincidental. Was the Coonamble correspondent there in 1942? If so, why didn't he learn from his experience?

We can also look at a contemporary example of similar thinking. During a meeting of emergency managers and community leaders in a town in the Namoi valley in 1998, arrangements for the preparation of the community for a major flood were being discussed. The SES advised the meeting that a sandbag-filling machine had been redeployed from elsewhere and was on its way. A senior emergency manager present acknowledged that this was a good move but stated that its arrival into town should be disguised so that it would not cause the community to panic. The community in question was aware that there was significant heavy rain falling over the catchment and that the creeks and river were in flood. They have an expectation, and a right, to be forewarned of the possible threat and that preparations are under way. One would argue that adequate warnings and advice on the type of preparations being undertaken would ease their concerns and not necessarily create panic. Properly developed and promulgated, they should encourage appropriate action.

HOW CAN COUNCILS CONTRIBUTE TO THE IMPROVEMENT OF FLOOD WARNING SERVICES?

Councils can provide valuable technical input to the understanding of the flood problem. Councils may have access to engineering data that can help build a better picture of the likely impact of floods on the community. This data is often highly technical and may be presented in ways which make it difficult to interpret for non-engineers. The SES will need help to expose the relevant flood intelligence. A current example is the Dam Break studies being produced for some council owned dams. These studies are very technical and focus on the issue of dam failure. This failure may not be a threat until flooding is already severe to extreme. The studies will often not include an assessment of the rising limb of the flood because under a pure risk management approach, it is only the incremental damage caused after dam break that is of immediate concern (Keys, p3). A slightly broader view which may only require a small expansion of the study terms of reference (and not cost much more) may provide invaluable data on the whole flood problem.

Councils (and other agencies) can recognise the potential for positive image building through being an active partner in flood warning and not using the often overstated potential for negative image. This concern about negative image is most commonly manifested in the fear of panicking residents or scaring off tourists by talking about floods. If this does happen it is actually a result of poor warning. Why? Because good warning tells people what is **not expected to happen** as well as what is expected to happen. Good warning also needs to recognise that not all the affected community necessarily lives in the immediate area of the flood.

Councils can recognise that flood warning is a shared responsibility. The SES has a legislated responsibility to deal with floods but councils also have a duty of care to their community. The SES is an organisation with its roots in the local community and can only exist with the support and partnership of local government. SES units cannot be maintained on remote life support from SES State Headquarters – a lack of council support will mean a non-viable SES unit. A combined effort is much more likely to yield success.

HOW CAN THE COMMUNITY CONTRIBUTE TO THE IMPROVEMENT OF FLOOD WARNING SERVICES?

The option for community contribution may be limited. They rely on the good conduct of the responsible agencies. Despite this reliance there are some things the community can be encouraged to do.

Members of the community can come forward with information about the impact of flooding on themselves and how they wish to be warned about impending floods. This should be facilitated by agency consultation. The community needs to be given confidence that the information they provide will be used in a spirit of cooperation and confidentiality.

People must accept that because of the natural uncertainty in flood behaviour, some inconvenience is inevitable if flood warning is to be conservative and provide for margins of error. The SES and others will not get it spot-on every time and will never get it right for everyone in any event. The behaviour of organisations is affected by perceptions of community expectation. The example below may be an indication of this effect.

During the floods in the Namoi Valley in 1998 there appeared to be a tendency at the local level to want hold back until the last moment before warning the public of possible danger. The Bureau of Meteorology provided timely flood predictions and yet there was a tendency for local people (including local SES) to try and double check or verify the Bureau's predictions and try to establish for themselves that the predicted heights would be realised. In doing so valuable time was lost that could have been used to provide earlier and better warning messages to the community at risk. Too much time can be spent trying make sure information is exact.

The community needs to recognise that flood warning is for them and not for the SES or council. People should try to prepare for flooding by having some personal contingency planning in place. This is unlikely to be formal and may only take place after the issue of a flood warning. The simple things like remembering to take (or

protect) valued personal documents and photographs are critical. Importantly, if the community is not happy with the flood warning service, they should say so. . The community should not have to suffer in silence if they believe they are not getting a quality flood warning service. Offer constructive criticism of flood warning services.

HOW CAN THE SES CONTRIBUTE TO THE IMPROVEMENT OF FLOOD WARNING SERVICES?

The SES must be responsive to constructive criticism. It is certainly true that not all comments made by the community after a flood will be valid or flattering (see the Coonamble example at the start of this paper) . The SES must, however, consider what is said and try and work out why it was said. Underlying most criticism is a belief that someone got it wrong.

As an example, a flood warning, which turned out to have over-predicted the expected height, was issued in the early hours of the morning for the business area of Moruya. The SES was heavily criticised for the inconvenience caused. Rather than ignore this criticism, the SES confronted the issue and arranged to meet the key players. After some initial high spirited discussion a constructive dialogue took place in which both sides came to a better understanding of the needs and motivation of the other. Better contact arrangements were established for future events. It was accepted that for the SES not to have acted because of uncertainty was not possible or desirable.

Improving Flood Intelligence

The SES is working to build a better understanding of the likely impact of floods on the whole community. The development of a comprehensive flood intelligence system (or flood information management system) is the linchpin without which the flood warning system theory can not be translated into practice. Fundamental to developing flood intelligence is the need to identify and then communicate with the likely warning recipients.

The Bureau of Meteorology can make reasonably accurate stage and peak height predictions for a given location to provide indications of when minor, moderate and major flooding will occur. However, these warnings provide expected river gauge height (ie. the vertical dimension) and do not elaborate on the possible impacts that flooding may have on nearby communities and infrastructure. Prediction is only one (very important) component of the total flood warning system.

It is essential to break the old warning mindset: that warnings are only about postboxing the Bureau's height and time predictions (Handmer, Keys, Elliott, p17). In order to value add to a height prediction it is necessary to determine the known or likely affects that can occur leading up to and including the predicted height (ie. the horizontal dimension).

To be forewarned is to be forearmed; "The reason the enlightened prince and the wise general conquer the enemy is foreknowledge. This knowledge must be obtained from men who know the enemy situation." (Sun Tzu). In the context of flood

intelligence, the enemy situation is the known or likely behaviour or nature of the flooding.

Flood intelligence is not just the realm of the emergency planners. The collection of flood related data is the most time consuming element of the process and it involves the SES working in consultation with council staff, government agencies (eg Land and Water Conservation- DLWC), and the community. Flood data is obtained from a variety of sources including but not restricted to the results of flood studies and floodplain management studies, post flood field visits by SES flood planning staff, anecdotal evidence, historical records, and observations during events. Once gathered this data is then collated, analysed and interpreted so that the possible effects of floods can be predicted in the future. The outcomes from this process are then recorded in a computerised flood intelligence system for storage and re-use in the future. The primary use is the construction and timely promulgation of flood warnings to the community.

The SES is vigorously pursuing the improvement of it's flood intelligence records. In the early days of SES's history, flood intelligence consisted of recording what occurred at various heights on flood gauge onto a flood intelligence card. Flood intelligence cards were maintained to varying degrees of quality across the state. Importantly, they did not provide information about what could happen in floods more severe than those experienced **and remembered** (Opper, Keys, 1998, p2). This is a serious deficiency, especially if the worst flood experienced are thought to be only those with around a 10 or 20 year Annual Recurrence Interval (ARI).

DEVELOPING FLOOD INTELLIGENCE DURING AN EVENT - THE NARRABRI EXPERIENCE (or, "So this gauge doesn't work any more?")

During the Namoi River floods of 1998, major flooding was predicted for Narrabri and a flood warning was issued by the Bureau of Meteorology. The flood intelligence card for Narrabri was found to be inadequate. A situation made worse because there are two river gauges at Narrabri. The intelligence was found to be linked to the gauge which was no longer indicative of flood flows. The Namoi River channel capacity at Narrabri has steadily decreased since the 1960s. The result was that the main flow channel at Narrabri has become the Narrabri Creek and the Namoi River channel is only active at times of high flow. This reduced the sensitivity of the readings on the Namoi River gauge at Narrabri for flood flows below the major flood levels.

All of the flood intelligence for Narrabri was related to the gauge on the Namoi River. There is no linear correlation between the two gauges and so the information on the existing flood intelligence card could not be transferred to the new gauge easily and was thus practically useless. To compound the problem, the community had historically been used to interpreting flood behaviour in relation river heights on the old (Namoi River) gauge. Effectively, this meant that the flood managers and therefore the community at Narrabri were in the dark as to what effects they could anticipate in the impending flood.

The community, other emergency services, and officers in the SES Division and State operations centres were pressing the SES Local Controller for information

about the likely effects of the coming flood. Fortuitously, the Namoi SES Division Headquarters had redeployed the Planning and Research Officer from the SES State Headquarters to Narrabri to assist. Together, with the assistance of the Narrabri Shire Council, members of the Local Emergency Management Committee and other community leaders they were able to put together an interim flood intelligence card based on the Narrabri Creek gauge. Using this card as a basis, the community was then able to make the necessary preparations for the predicted height. The local flood plan was activated, the local emergency management committee was briefed, contingency plans were made.

High on the list of tasks was the need to warn the occupants of residences at risk of flooding. Flood warnings were given a lot of emphasis. As the planning was going on, the SES worked with the Local Emergency Operations Controller and other members of the emergency services and supporting agencies in an effort to construct a quality warning message that would hopefully not be misinterpreted. The warning was then broadcast via radio and television. To ensure that everyone received the warning, the town flood wardens supported by SES crews commenced a doorknock campaign. Doorknockers were carefully briefed and issued with a copy of the warning so that it could be read to the householder verbatim (time did not allow for the warning to be duplicated for hand delivery). There were a number of instances where the warning message was misinterpreted but, on the whole, this broadcasting of the warning supplemented by narrow cast strategies such as doorknocking and the provision of an information line paid dividends.

GATHERING FLOOD INTELLIGENCE DURING AN EVENT

An example of gathering data during a flood was the operation mounted to record the location of properties located on the floodplain. Helicopter pilots on resupply missions started to experience navigational difficulties in flying over the flooded terrain. This problem, compounded by the out of date maps in use which had poor rural property identification, meant that valuable time was being lost. It was also realised that serious problems could arise if an emergency situation was to occur. Arrangements were made for SES volunteers with detailed local knowledge to accompany the resupply runs and they were briefed to record the geographical locations of the homes using a hand held global positioning system (GPS).

By the time the flood operations were over, the SES had developed a database of over 266 properties located on the floodplain. The database contains not only geographical details but also other information such as contact numbers and details of the occupants. This information is invaluable for warning purposes and is being shared with the wider emergency service community and the Narrabri Shire Council. The database will continue to be maintained by the SES with input and assistance from the Narrabri Shire Council and the other emergency services. This will prove to be an invaluable tool for other flood events or for any other emergency situation that may arise in the future.

THE BENEFITS OF PREPARATION BEFORE A FLOOD- THE WEE WAA EXPERIENCE

Wee Waa has the advantage of having a longer lead-time to prepare for impending floods than the communities higher up the catchment. Coupled with this, in 1998, Wee Waa also had the advantage of being able to learn from what was unfolding in the preparation and flood response operations being conducted by the other upstream communities. Already, heavy rainfalls in the local area meant that the black soil roads were closed at short notice. People living on the floodplain had little or no time to stock up with essential supplies. Fortunately, arrangements were made by the SES very early in the event to have helicopters pre-positioned at Wee Waa for the inevitable resupply operations.

The Acting SES Unit Controller at Wee Waa realised early in the flood the importance of having a prepared community and the need for a cooperative effort. From the outset, SES operations were pro-active and every effort was made to involve the Narrabri Shire Council and the Narrabri Local Emergency Management Committee. The local knowledge of previous SES Controllers and members, the cotton industry, other emergency services, community leaders and the representatives of the local community was sought. The flood intelligence cards, which had been revised well before the event were consulted and the flood plan was activated.

An improvised operations centre was set up in the SES Unit Headquarters, which was still under construction. A briefing was conducted and personnel were allocated tasks. The local police were extremely cooperative and provided a liaison officer to the SES headquarters. The team from Department of Community Services also decided to operate out of the SES headquarters. People with specialist skills and detailed local knowledge were recruited and put to work. Detailed, up-to-date maps of the local area were acquired from the local cotton companies. In a very short period of time flood planning/intelligence, communications, mapping, helicopter tasking, flood information and flood boat operations sections were set up and staffed.

The local FM community radio station, MaxFM, provided a forward broadcast facility and provided almost continuous broadcasts on the flood situation. A duty officer system was instigated; team and task leaders were appointed and briefed on their responsibilities. Contact was made with isolated rural people and there were extensive efforts to keep the public informed using all available media. In short, Wee Waa was prepared and ready without any need for last minute doubt about the validity of the predicted impact.

CONCLUSION

In the final analysis the flood operations at Narrabri and at Wee Waa both achieved an acceptable result. The difference is that in the case of Narrabri, a lot more tension and emotional energy was expended to get to the starting line where the warning process could be initiated. Importantly, lessons were learned and the next generation of flood plans and flood intelligence cards will provide for a smoother operation next time. In the mean time, the work of improving the warning systems

must continue and the SES, with the cooperation of councils and other agencies, will endeavour to keep the standard rising.

It is appropriate to give the last words on the implications of poor quality warnings to someone from the community. All of us who have a role in the development of flood warning systems should consider the implications of this comment. Flood warning systems must focus on the needs of the community. The owner of a motel at Narrabri who was not happy with the quality of the warnings provided during the early stages of the floods voiced his concerns thus: **“Heights mean nothing to me mate! I am not from here and I’ve only been in town for a little over 12 months.”**

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