

AUSTRALIAN DISASTERS CONFERENCE 2008
Surviving Future Risks

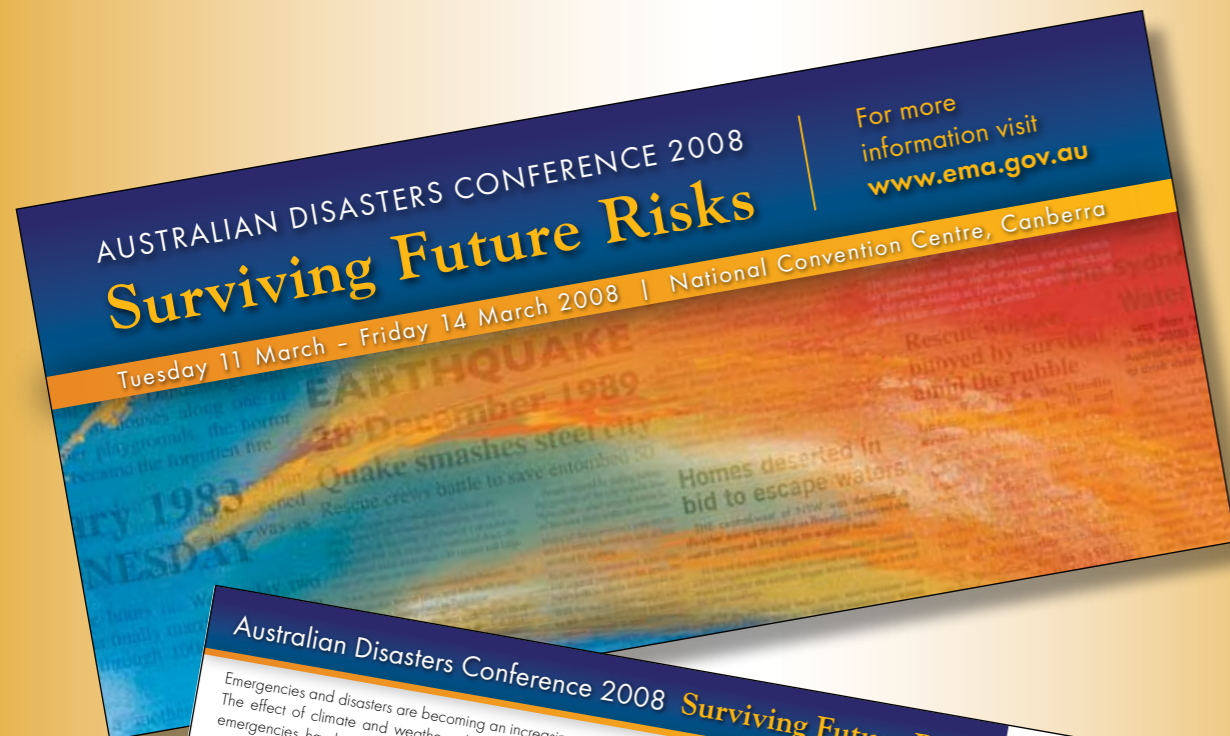
The Australian Journal of
Emergency Management



Australian Government
 Attorney-General's Department
 Emergency Management Australia

EMA 'safer sustainable communities'

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Australian Disasters Conference 2008 Surviving Future Risks

Emergencies and disasters are becoming an increasing part of our lives, whether they are nature's way or human caused. The effect of climate and weather related events on our lives has become a focus throughout the world. Managing emergencies has become a priority for governments at all levels as well as for the business community. Managing our communities understand the hazards and are prepared for the unexpected. The Australian Disasters Conference 2008 will provide participants with the opportunity to hear a diverse range of speakers from the fields of emergency management, community safety and risk reduction. The Conference will be an opportunity for interaction with representatives from a broad range of disciplines, while the exhibition display and social events will provide further opportunities for networking and discussion on community safety issues.

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Exercising helps with aquatic animal disease in Victoria

What do we do about firefighter fatigue?

How do firefighters come down from the high of deployment?

historical snapshot



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Hunter Valley Floods, February 1955

On 23 February 1955 torrential rain developed over the Hunter Valley area of New South Wales. Rainfall totals exceeded 250mm in 24 hours between Nevertire and Dunedoo. Heavy rains travelled east across the Liverpool Ranges and down the Hunter Valley. At Maitland, on the banks of the Hunter River more than 5,000 homes were flooded – in some cases submerged – by anything up to five metres of muddy water. About 15,000 people were evacuated, many plucked from rooftops by boat or helicopter. Fourteen lives were lost, including five due to electrocution during rescue operations. At Singleton another 1600 homes were flooded.

West of the Divide, the Macquarie River exceeded its previous record height by 1.6 metres at Dubbo, where five houses were destroyed and 4000 residents evacuated. More than a metre of turgid, muddy water covered the main street. It was a similar story at Narromine, Warren, Trangie and other towns in the Macquarie Valley. The Castlereagh River also reached a record height, with waist-deep water swirling through the shopping centre at Gilgandra, wrecking a third of the buildings. A hole torn in the main street was later found to contain two large semi-trailers. Twenty-four homes were totally destroyed and 350 were badly damaged.

The Namoi and Gwydir valleys were devastated. Narrabri was completely isolated; water up to three metres deep covered some streets. About 1000 homes at Narrabri, and nearly as many at Moree, suffered water damage. As a whole, the flooding took the lives of 25 people. Some 2,000 cattle and many thousands of head of other livestock were drowned. The damage to bridges, roads, railways and telephone lines took months to repair.

The Hunter Valley event was but one - albeit the most spectacular - of many heavy rain episodes over eastern Australia between late 1954 and the end of 1956, a period dominated by La Niña conditions. The year 1956 was remarkable in that repeated flooding occurred throughout the vast Murray-Darling river system throughout the first half of the year.

Source: Bureau of Meteorology <http://www.bom.gov.au/lam/climate/levelthree/c20thc/flood5.htm>

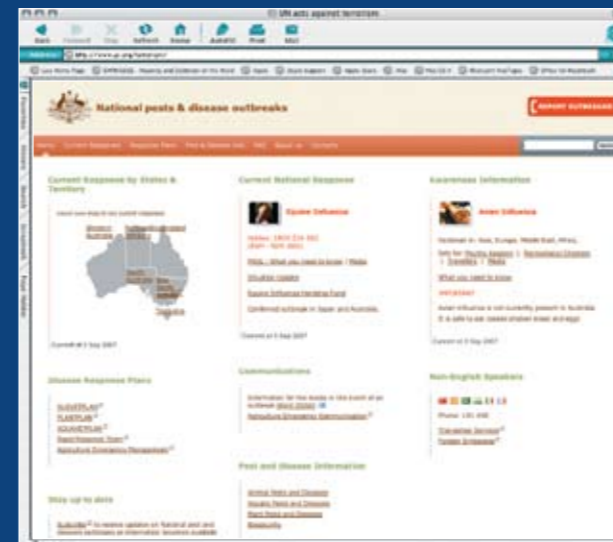
interesting websites

Managing Equine Influenza



CSIRO

For further information see <http://www.csiro.au/resources/EquineInfluenza.html>



National Pests and Disease Outbreaks

For further information see <http://www.outbreaks.gov.au>

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FOREWORD

by Tony Pearce, Director General, Emergency Management Australia



I recently returned from a visit to Canada and the US where I met with a number of Federal, State/Provincial and local government officials to explore a number of issues. Not the least of these was an analysis of where things are currently at in the US regarding the Department of Homeland Security (DHS) and more

specifically how EMA's counterpart organisation the Federal Emergency Management Agency (FEMA) is progressing since the recent introduction of the Amendment Bill designed to address some of the issues that have arisen since FEMA became a part of DHS.

I visited Toronto and Ottawa and met with numerous officials from the various agencies that comprise Public Safety Canada. These meetings were extremely beneficial and interesting. Apart from the fact that they have 10 Provinces and 3 Territories versus our 6 States and 2 Territories, the Canadian system is almost identical to ours. They were extremely interested in a number of Australian initiatives including our Critical Infrastructure Protection processes and the relationships with the private sector that have resulted through that. They were also very interested in the *Working Together to Manage Emergencies* program that contains the National Emergency Volunteer Support Fund and Local Government Support Fund.

I attended the Canadian Emergency Management College and discussed the Emergency Management Australia Institute (EMAI) facility with them. They were thoroughly impressed with the description that I gave them of EMAI and its programs, envious of the relationship that we have with the States and Territories relative to EM education and training, and of the institute's library and resource centre which is renowned for being the largest and best resourced facility of its kind dedicated to emergency management in the southern hemisphere.

After leaving Canada I went to New York City and had meetings with the CEO/Director of the New York State Emergency Management Office, New York State Department of Homeland Security Regional Office and the Mayors Office of Emergency Management. These meetings predominantly looked at local/state/federal emergency management relationships, discussions on community warning concepts, and public education considerations.

Following New York I went to Washington DC and had meetings with many different areas of the DHS. The highlight of this was meeting with my counterpart the Administrator of FEMA, Mr. F. David Paulison. We spent a considerable time talking about the DHS concept and its pros and cons as well as looking in depth at the US implementation process which is still clearly a bone of contention for many, and finally the recently introduced Amendment Bill that attempts to address some of the FEMA issues and the Hurricane Katrina Reform Bill.

I also met with Senator Landrieu (Senator for Louisiana) who sits on the President's National Security Committee and is also heading up the Hurricane Katrina Senate inquiry on behalf of that committee. The Senator was keen for me to explain the National Registration and Inquiry System, Australian building code requirements in cyclone prone areas and most interestingly wanted to discuss how it is that we get our communities to listen to the authorities prior to and during emergencies, and more importantly, why they trust us. This issue of a lack of trust was clearly one of the major issues that had arisen in the inquiry. I think that we sometimes underestimate, and clearly lack understanding of how valuable the trusting relationship is between the Australian community and government with regard to emergency management.

After leaving Washington DC I went to San Antonio in Texas. My visit here saw me participate in a multi-agency workshop on the impacts that the consequences of Hurricane Katrina in New Orleans had had on Texas. This was one of the more thought provoking and revealing parts of my time away. More than 200,000 refugees from Louisiana were sent to Texas and nearly 100,000 of them are still there. The social structure/order impacts that this has had are staggering. There are clearly some major social policy issues that we could learn from the experiences of these guys and what I referred to as the 'secondary disaster of Hurricane Katrina', issues that to this time I am sure have never been considered adequately in this country. Food for thought maybe.

Tony Pearce

A handwritten signature in black ink, appearing to read 'A. Pearce', written in a cursive style.

Community and fire service perceptions of bushfire issues in Tamborine Mountain: what's the difference?

Sally Bushnell, Luke Balcombe and Alison Cottrell describe the similarities and differences in perceptions between Tamborine Mountain fire services and their community, and discuss the implications.

Abstract

The social construction of risk explains that public perceptions of an objective hazard are often shaped through social and cultural processes. Hazard managers tend to focus on the objective risk, and as a result can often perceive a risk and related issues very differently to the community they are servicing. This has important implications for hazard management. This paper reports on research that investigated similarities and differences in perceptions of community bushfire risk and issues between the community and fire services in Tamborine Mountain in Queensland Australia. It discusses the implications for bushfire service delivery, and also provides an example of how understanding bushfire hazard perceptions and other issues within a community can give direction to locally-specific strategies targeting community safety.

Introduction

This paper reports the results of a case study undertaken in Tamborine Mountain in southeast Queensland. It highlights similarities and differences in perceptions of community bushfire risk and issues between the community and fire services in the locality, and it discusses the implications for bushfire service delivery. It also provides an example of how understanding bushfire hazard perceptions and other issues within a community can give direction to locally-specific strategies targeting community safety.

Risk can be defined as the product of the probability and consequences (magnitude and severity) of an adverse event (Bradbury, 1989). Negative risk increases as the probability of a negative event increases, and as the expected consequences grow worse. This combination of probability and consequence results in ambiguity and consequently, perceptions of risk can be complex and are not homogenous (Sjoberg, 1999). In the context of hazard management, this is important because it can help explain the often large variation in perceived risk between the experts, or hazard managers, and the public. Experts tend to focus on the probability of a risk, and calculations are often technically complex, due to the need for theoretical models to achieve greater precision when dealing with rare events (small probabilities) that have large consequences (Sjoberg, 1999). Probability is a difficult concept for the public to understand; consequences are much less complex, easier to relate to and therefore understand. Thus, public judgements of risk are often based on consequences (Sjoberg, 1999; Renn, 2003). However even this process can become complex when considered within the context of everyday life which includes other risks, personal and social matters. Such a process can be described as the social construction of risk; the objective hazard is mediated through social and cultural



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Firefighter wearing breathing gear as bushfires rage.

processes (Lupton, 1999). This can be a difficult concept to understand and accept, however public perceptions often drive priorities on where and how to reduce or manage risk, it is therefore important that perceptions are understood as it leads to effective policy (Byrd and VanDerslice 1996; Renn, 2003).

Understanding how a risk is perceived is a challenging process accentuated by the fact that a certain risk can be perceived very differently by individuals both within and between localities (Bushnell and Cottrell, 2007). The case study described here goes some way to illustrating the complexities of this type of issue.

Methodology

Study area

Tamborine Mountain is located 60km south of Brisbane in southeast Queensland (Figure 1). The area is characterised by escarpments, tall open forests and sub-tropical rainforests, and is consequently picturesque. The study area is peri-urban and thus incorporates residential, rural and farming properties. The level of bushfire risk is considered high by the Queensland Rural Fire Service (QFRS), and in recent times there have been no significant bushfire events. Extensive bushfires occurred at Tamborine in the 1960s, and in 2004 there were bushfires in an adjacent area. The most common natural hazard in the area is storms. Four fire brigades service the area, these include Auxiliary Fire Brigades (AFB) and Rural Fire Brigades (RFB). AFBs service urban areas and members are paid part-time, RFBs primarily service rural areas and members are voluntary. Queensland Parks and Wildlife Service (QPWS) and the Defence Force also have fire-fighting capabilities. The main response activity of the fire services in the area is for motor vehicle accidents.

A mixed methods approach was used for data collection, including individual and group interviews, document analysis and a mail survey.

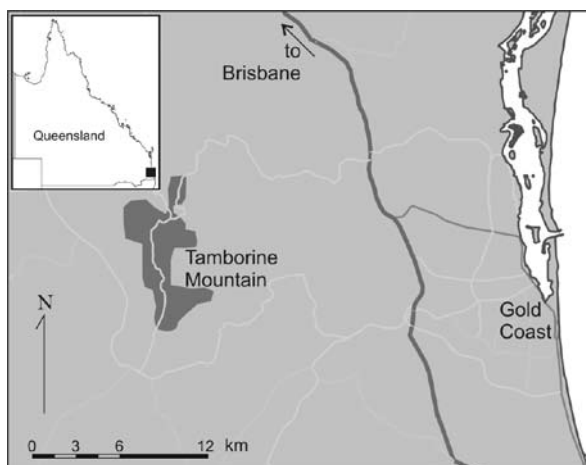


Figure 1. Tamborine Mountain study area in south east Queensland.

Interviews

Initially, a number of individuals from local and state government and volunteer organisations were interviewed. Group interviews were undertaken with members of the local fire brigades and with members of local community groups. This was to identify local bushfire issues in the area and to guide questionnaire development. It also provided the means to document fire brigade perceptions of community fire issues, that is their perspective on how the community perceives the bushfire risk and other bushfire related issues.

Mail survey

A four-page 41 item self-completion questionnaire was designed to collect data on a wide range of social factors including: demographics and property/lifestyle factors; hazard experience; perception of local hazard risks; knowledge and attitudes in relation to bushfire hazard management; views on responsibility for bushfire-related activities; participation in bushfire preparation activities; and preferences for bushfire information. The questionnaire was trialled in a pilot survey and appropriate changes made before the final version.

Data collection

In total, 500 questionnaires were delivered in May 2005. Questionnaires were hand-delivered to mailboxes based on a representative sampling methodology. Respondents were asked to return surveys by mail using the postage-paid return envelopes provided with the survey. An overall response rate of 33% was achieved with a total of 163 completed surveys returned.

Data analysis

Data for all survey questions were analysed descriptively. For quantitative data, Chi-square tests were used to test for statistically significant relationships between variables of interest. For qualitative data, themes and topics were identified from comments provided by respondents.

Results

A number of similarities and differences in perceptions about bushfire issues between the community and fire services were identified, and these relate to risk perception, roles and responsibilities and bushfire hazard management.

Risk perception

Interviews with fire service members indicated that there were strong views within the community regarding bushfire risk. The environment is an emotive issue for many people, and this can take precedence over bushfire issues. One brigade member commented that “views regarding bushfire risk are challenged by environmental groups who are passionate about the issue”. Interviews with community groups confirmed that development of rainforest and degradation of the natural landscape in the area is often of more concern to residents than bushfire. The community survey revealed that 86% of respondents had moved to

Tamborine Mountain to be close to nature (Table 1), and comments provided by respondents revealed a common theme: living in a bushland or rainforest setting is often more important than the risk of bushfire. Fire services suggested that this orientation of values toward the natural environment was linked with a lack of awareness of bushfire risk. For example, it was said that “people are unaware of bushfire risk and don’t think about things they should do, even when they build in risky areas”. However, the survey data reveals that there is a general awareness within the community; most respondents (79%) indicated that they have thought about fire risks (Table 1), and analyses found no significant relationships between thinking about fire risks and whether the respondents had moved to the area to be close to nature or whether they believe the bush should be left untouched. Comments suggest that residents living within a high fire risk setting choose to do so in order to benefit from living within nature. One respondent commented: “Love trees. Want to be surrounded by them. Fire is a concern but that is my choice”.

Table 1: Respondent agreement with statements about bushfire risk

Perceptions of bushfire risk	Strongly Agree %	Slightly Agree %	Neither %	Slightly Disagree %	Strongly Disagree %
I am less concerned about the risk of fire than about other risks to personal safety (N=150)	14.7•	36.7•	18.7•	14.7•	15.3•
I moved here to be close to nature (N=156)	46.1	38.5	10.3	1.9	3.2
I think about the risk of fire here everyday (N=156)	1.9	19.9	16.7	22.4	39.1
The impact of fire is far greater than of any other risk (N=155)	30.3	25.8	12.9	22.0	9.0
The bush should be left as untouched as possible (N=155)	36.8	24.5	5.2	24.5	9.0
I haven't really thought about fire risks (N=147)	1.3	11.6	8.2	23.1	55.8

A majority of respondents (62%) disagreed with the statement “I think about the risk of fire here everyday” (Table 1). This appears to relate to the balancing of risk with the benefits of living close to nature. Many respondents indicated that, while aware of the risk, they thought more about their surrounding environment, one respondent commented “Live surrounded by remnant rainforest - beautiful and peaceful environment”. Community groups also indicated that the “main priority of those on top of the escarpment is view”. Some survey respondents commented that there are other risks and issues that they think about more frequently than bushfire, for example one respondent explained “Fire is a risk concern, though other concerns outweigh fire”. Other concerns included personal, family and health matters, and home and environmental matters. Finally, other respondents commented that there is not a high risk of bushfire where they live, for example in a

residential street, and they therefore did not think about bushfire everyday. Respondents stating that they did not think about the risk of fire everyday also tended to be less concerned about the risk of fire than about other risks to personal safety ($\chi^2 = 22.432$, d.f. = 4, $P = 0.01$). Such infrequent thoughts about bushfire may reflect fire service perceptions that their community, whether they are aware of the bushfire hazard or not, tend to not think about the risks associated with bushfire until a bushfire arrives.

Roles and responsibility

Fire services were concerned that their community is confused about the roles of urban and rural fire brigades. A fire service member commented that “people do not understand about two brigades on the mountain, often think all RFB... often people do not

know the difference between the red and yellow trucks – they just expect a fire truck to come immediately... different response as Auxiliary red trucks are not supposed to go off road and RFB go off road". The community groups interviewed demonstrated a good understanding of fire brigades in the area: "[There are] urban paid volunteers and RFB unpaid volunteers. They assist each other. RFB can go off road. RFB in cost squeeze as funds depend on number of properties. RFB also responsible for national parks but receive no funding for this. People are dependent on RFB as the only brigade with off road vehicles. RFB lack of funding and manpower are serious issues". The survey data could not confirm wider community knowledge of Tamborine Mountain fire brigades. Responses concerning who they would obtain advice from in relation to bushfire safety measures clearly indicated wide recognition of a local brigade servicing the area. However, few respondents specified the RFB, rather referring to the "fire brigade" or the "local rural fire service", for example. Furthermore, the AFB (Auxiliary Fire Brigade) was not selected by any respondents despite their service to a majority of houses in Tamborine Mountain and active role in bushfire safety. This indicates a potential lack of distinction between the two brigades within the community, however additional data is required for confirmation.

Fire services personnel were also concerned about community expectations of fire brigades. Comments included: "many people do not realise that... 000 will not necessarily bring a brigade to their property" and "[people] just expect a fire truck to come immediately". The community survey specifically asked respondents to agree or disagree with the statement: "if fire were to arrive, we would just call the fire brigade". Responses were divided: 47% agreed and 49% disagreed (Table 2). The data suggests that those who disagreed may be better prepared for bushfire, and perhaps less dependent; 44% of respondents stated that they had a bushfire plan, and this was significantly associated with disagreement about calling the fire brigade if fire were to arrive ($2= 7.057$, $d.f.= 2$, $P= 0.02$). Those who agreed tended to lack confidence in bushfire safety, for example agreement was significantly associated with a lack of confidence in having the equipment needed to deal with fire and a lack of confidence with first aid ($2= 8.149$, $d.f.= 2$, $P= 0.01$ and $2= 5.837$, $d.f.= 2$, $P= 0.05$). Calling the fire brigade if fire arrived was also significantly associated with agreement that there is little you can do to protect yourself and your home against bushfire (Table 2) ($2= 9.171$, $d.f.= 4$, $P= 0.05$).

Table 2: Respondent agreement with statements about protection from bushfire

Perceptions of fire risk	Strongly Agree %	Slightly Agree %	Neither %	Slightly Disagree %	Strongly Disagree %
There is very little you can do to protect yourself and your home against bushfire (N=149)	1.3	6.7	2.7	17.5	71.8
Protecting my home properly is too expensive (N=147)	1.4	7.5	12.2	25.2	53.7
There is no point in me protecting my property if my neighbours don't (N=151)	3.3	7.3	4.6	19.2	65.6
If fire were to arrive, we would leave rather than try to protect our property (N=135)	18.5	18.5	3.0	24.4	35.6
Survival is more about instinct than planning (N=145)	9.7	12.4	4.8	28.3	44.8
There is no point protecting my property if council/other agencies don't clear foliage/ back burn (N=151)	13.9	13.9	2.7	22.5	47.0
If fire were to arrive, we would just call the fire brigade (N=146)	26.7	20.6	4.1	21.9	26.7

It was mentioned by fire services that high expectations of brigade services may be the result of a lack of personal responsibility for fire safety within the community. One brigade member explained that “many people do not realise that they are responsible for their property”, and they consequently rely too heavily on fire services. The survey data revealed that respondents who view the householder as less responsible for keeping homes safe from bushfire than others (e.g. QFRS or council) were more likely to agree that they would just call the fire brigade if a bushfire arrived ($2= 8.705$, $d.f.= 2$, $P= 0.01$). This was similar for respondents who viewed their neighbours as more responsible ($2= 11.077$, $d.f.= 2$, $P= 0.01$), and who agreed that there is no point in protecting their property if council/other agencies don't clear foliage and back burn ($2= 9.7834$, $d.f.= 4$, $P= 0.05$) (Table 2). However, according to the survey, a majority of respondents selected the individual householder as most responsible for keeping homes safe from bushfires (Figure 2). Most survey respondents also indicated that they undertook a number of bushfire preparation activities, although the most common activities undertaken relate to general housekeeping, and bushfire specific activities may be neglected (Table 3). According to Table 2, most respondents also believed that there is something they can do to protect themselves and their home against bushfire, that protecting their homes is not too expensive, that survival is about planning, and that it is worth protecting their homes even if others do not. Furthermore, a majority of respondents (60%) indicated that they would try to protect their property rather than leave (Table 2). However, intentions to stay and defend the home was not significantly associated with having a bushfire plan, and intentions to evacuate was not significantly associated with the preparation of an evacuation plan. It seems that people think they are prepared, and think that they have adequate plans in place. Therefore, although the fire services can see that people are inadequately prepared, it is not necessarily for lack of concern.

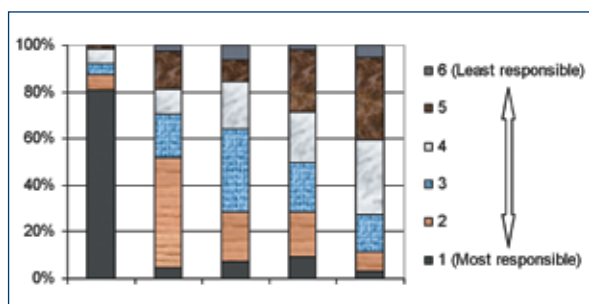


Figure 2. Respondent views on who is responsible for keeping homes safe from bushfire.

Table 3: Bushfire preparation activities undertaken by respondents	
Bushfire preparation activities	Action taken (%)
Cut the grass	99
Removed overhanging branches	96
Ensured flammable items and fuel are safe	96
Cleared junk out of the yard	95
Cleaned out the gutters	95
Checked sources of water and hoses	93
Installed smoke alarms	83
Checked smoke alarms	82
Checked equipment	56
Purchased fire extinguisher or blanket	48
Established fire breaks or buffers	42
Brushed up on First Aid knowledge	39
Formulated an evacuation plan	37
Talked to the neighbours about fire safety	27
Decided on situations to stay or go	26
Contacted Council about clearing vegetation	21
Established a local warning system	8
Installed sprinkler system (internal/external)	8
Contacted the Fire Service for Safe Home visit	5

Bushfire hazard management

There was general agreement among fire services and the community that firebreaks are an important bushfire management strategy. Fire services did not identify any issues within the community concerning firebreaks. Community groups interviewed voiced their support: “fire trails have made a [positive] difference”, and explained that a “local fire management strategy developed 120 kilometres of fire trails”. The survey revealed that 75% of respondents believed that firebreaks are an essential part of bushfire prevention. Controlled burning however, was a more controversial management strategy according to fire services: “the public's response to hazard reduction [controlled burning] is that they don't want it”; “a majority of people do not want hazard reduction [controlled burning] because of negative effects”; and “some people have been lobbying for no-burn”. The survey suggested opposing community views, 89% of respondents believed that controlled burning is an essential part of bushfire prevention, and a minority believed there were negative effects (Figure 3). Interviews with community groups revealed that controlled burning can be a complex

issue; while there is general support for controlled burning, some residents are concerned about maintaining the biodiversity values in the area. One community member commented: “regular controlled burning can favour certain species so there is a need for irregular burning as there are 14 different ecological systems”.

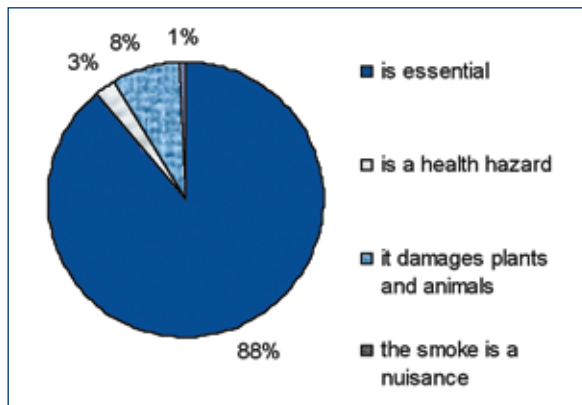


Figure 3. Respondent views on controlled burning.

Discussion

There were both similarities and differences in perceptions of community fire issues between fire services and the community. The data suggests that fire services recognise issues within the community, however clarification of these issues may be required. For example, in regard to risk perceptions, fire services identified the environment as an emotive issue for many people in the community, and this was confirmed through interviews with community groups and the community survey. However, fire services linked this with a lack of awareness of the bushfire hazard, which was not supported by the survey data; most respondents indicated that they were in fact aware. Despite this professed awareness, respondents explained that there are often other issues that take priority over the bushfire hazard; the objective bushfire risk has been mediated through social and cultural processes. It is important for fire services to understand these processes in order to deliver education strategies that better compliment people's lives rather than compete.

In terms of roles and responsibilities, fire services suggested that community expectations of brigades may not reflect the actual situation. As a result there can be a heavy reliance on brigades, particularly during a bushfire event, which is dangerous because brigades may not be able to assist all households in need because of limited resources. The survey data highlighted a segment of the community which may rely too heavily on brigades in the event of a bushfire. These respondents tended to be under-prepared and lacked confidence in undertaking bushfire safety measures, they also viewed themselves as less responsible for keeping homes safe from bushfire than others. A majority of respondents however, appeared

to be relatively independent, they viewed themselves as most responsible for bushfire safety and believed that they can protect themselves and their home against bushfire, for example. However, given that household preparations tended to neglect a number of bushfire specific activities, including developing a bushfire action plan or evacuation plan, residents may in fact rely more heavily on fire services in the event of a fire than they stated in the survey. This suggests that many residents may actually underestimate the bushfire event and associated risks, and overestimate their ability to cope with bushfire.

This case study clearly highlighted the similarities and differences between fire service and community perceptions regarding views on bushfire management strategies. The local Bushfire Management Plan, developed as part of the Tamborine Mountain Escarpment Management Plan (Watson, 2001), which was initiated by the community and developed in consultation with the community, specified the development and maintenance of 120 kilometres of firebreaks. Such community involvement and support provides fire services with an objective measure of community views. The Plan also outlined the undertaking of controlled burning, which should also indicate community support. However, fire services have noted a negative public response, which may have emanated from some environmental groups, and which may have lead to fire service perceptions that the community does not support controlled burning. The community survey indicates strong community support, and suggests that opposition to controlled burning is being voiced by a minority group. However, this minority group may be a well-informed one and should not necessarily be ignored.

Key implications

A major issue for fire services is one of how to gain attention when other issues take priority for the community. In addition, there is a need to approach preparedness issues in a multifaceted way. At Tamborine Mountain, there does appear to be a substantial section of the community which is not at all prepared. Conversely, there is a substantial group of people who think they are responsible for their safety, but are nonetheless not sufficiently prepared. The different groups will require different community education approaches. This is complicated by the fact that they are not a discrete, easily identifiable group. Of particular concern is the lack of evacuation planning that is evident. However, the Tamborine Mountain case study indicates that communities should not be viewed as a 'problem'. The fact that there was substantial community involvement in the preparation of an environmental management plan which included fire issues indicates that the community should also be viewed as a resource for fire services.

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Enhancement of the emergency disease management capability in Victoria: adapting Victoria's arrangements for the management of aquatic animal disease emergencies through Exercise Rainbow

Doroudi, East, Appleford, Walker and Button designed and conducted a workshop simulating a disease outbreak on a trout farm, with the aim of increasing Victorian government preparedness to respond to unpredictable aquatic disease emergencies

Abstract

Exercise Rainbow was designed to build capacity within the Victorian Department of Primary Industries (VDPI) to respond effectively and efficiently to an emergency disease incident in aquatic animals. Four preliminary one-day workshops were conducted with VDPI staff to provide training prior to the actual two-day exercise that simulated an outbreak of infectious disease on a fictional trout farm and in an adjacent natural waterway. Evaluation of the outcomes of the exercise and jurisdictional performance highlighted a good general awareness of emergency disease management procedures within VDPI, but a number of opportunities for further improvement and or development of the existing systems were also identified.

Introduction

Many fisheries and aquaculture industries around the world have suffered major production losses through the impact of disease epidemics (Agriculture Fisheries and Forestry – Australia, 2005). To date Australia has essentially avoided many of these documented disease epidemics. A major disease incident occurred in 1995 and 1998 which resulted in the death of a substantial proportion of the Australian wild pilchard population (Jones, Hyatt, Hine, Whittington, Griffin and Bax, 1997; Gaughan, Mitchell and Blight, 2000).

In 2002, a federal budget initiative entitled 'Building a National Approach to Animal and Plant Health', was announced which included a suite of projects to be funded over 4 years to the total of \$3 million for aquatic animal health research into the following four program areas: 1) diagnostic capability; 2) emergency preparedness (AQUAVETPLAN manuals); 3) emergency preparedness (training, for example simulation exercises); and 4) establishment of a joint industry/government body for aquatic animal health management (Agriculture Fisheries and Forestry – Australia, 2005).

Whilst the Australian Federal government had already prepared a range of resources such as the AQUAVETPLAN Control Centres Management Manual (Agriculture Fisheries and Forestry – Australia, 2001), due to differences between States/Territories in their policies and operational procedures, there was a need to adapt this Commonwealth resource to the local legislative and administrative requirements in each State/Territory. Further, in the event of an emergency



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The exercise simulated an outbreak of infectious disease on a fictional trout farm.

disease incident, the relevant jurisdiction must be capable of establishing a State/Territory Disease Control Headquarters (SDCHQ), with responsibility for strategic management of the disease outbreak, must be established, and it must ensure that appropriate interdepartmental and interstate relations and communications are in place.”

In 2003, the VDPI developed the ‘Victoria’s Arrangements for the Management of Aquatic Animal Emergencies’ (VAMA ADE), an adaptation of the AQUAVETPLAN Control Centres Manual (Agriculture Fisheries and Forestry – Australia, 2001) to local legislative and administrative requirements (Department of Primary Industries, 2003). The availability of response plans is only the first step. Staff must be familiar with these plans and able to implement them. One form of training that can develop these staff skills is the simulation exercise. Because of the relative absence of emergency disease events in the Australian fishing and aquaculture, government staff have had relatively little exposure to emergency management policy and procedures and therefore, simulation exercises provided an appropriate tool to test the VAMA ADE. Simulation exercises can also be used to ensure that the appropriate interdepartmental relations and communications are in place.

Over the past four years, the Office of the Chief Veterinary Officer (OCVO) within the Australian Government Department of Agriculture, Fisheries and Forestry (AG-DAFF) has conducted a program of simulation exercises designed to enhance the ability of all State/Territory jurisdictions to respond to an emergency disease event in the aquaculture industries. This program has now conducted seven exercises with individual States focussing on particular aquaculture industries within that State and three further exercises with participants from a range of jurisdictions focussing

on aspects of management of disease emergencies at a national level (Scott and East, 2004).

The objectives of Exercise Rainbow, the subject of this paper, were to improve pre-existing frameworks and resources in order to build capacity within VDPI and to develop more robust procedures for management of the response to emergency disease incidents.

Background

Due to the relative lack of emergency disease incidents in Australian aquaculture and fisheries, response plans are usually adapted from management systems developed for other unpredictable emergencies, including outbreaks of infectious disease among terrestrial animals. In one such study, the Australian government conducted *Exercise Minotaur* as a direct response to the foot-and-mouth epidemic which struck the UK in 2001 (Koob, 2004). Although relatively little is known about the broader impacts of disease outbreaks among aquatic animals, such studies of other unpredictable emergency incidents provide a general idea of their likely impacts on affected communities, and confirm the importance of increasing preparedness to manage aquatic animal disease emergencies.

The 2001 epidemic of foot-and-mouth disease in the UK, for example, had a serious impact not only on the livestock industry itself, but also a measurable impact on the mental health of farming communities (Peck, Grant, McArthur and Godden, 2002), and wide-reaching impacts on rural economies (Donaldson, Lowe and Ward, 2002). Other studies indicate that psychiatric morbidity associated with such emergencies is also lasting (McFarlane, Clayer and Bookless, 1997 discuss the example of bushfire emergencies). The impacts of animal diseases on terrestrial farms in Australia are likely to be the greatest in regional economies with the

lowest diversification (Garner and Lack, 1995). Similarly we may also expect the social and economic impacts of aquatic animal disease emergencies to be greatest in regional areas where aquaculture or fisheries are a major component of the economy.

Method

A preliminary one-day training workshop was conducted to provide regional VDPI staff with training in emergency management of aquatic animal disease outbreaks as detailed in 'Victoria's Arrangements for the Management of Aquatic Animal Disease Emergencies' (Department of Primary Industries, 2003). These preliminary workshops were conducted over a period of four days from 27th to 30th April 2004 with VDPI staff from the four regions of Victoria (Gippsland, North, Southwest and Port Philip Bay). The major subjects of the training workshop were:

- Fish disease – emergency response arrangements
- Fish-kill investigations
- Responses to emergency fish disease
- Fisheries Victoria's role in an emergency response.

The basic scenario for the subsequent two-day simulation exercise involved a disease event on a fictional trout farm in the Snobs Creek area (300 km north of Melbourne). The simulation also involved occurrence of the disease within the adjacent natural waterway, Snobs Creek. This geographic site was chosen because the farm was sited upstream of a significant proportion of the Victorian trout industry. The simulation was called *Exercise Rainbow* after the Rainbow Trout, the predominant species of trout grown in the area.

Seven days prior to the exercise, each participant received a preliminary briefing document, *Instructions for Participants* that included details of how the exercise would be conducted and explained the basic scenario and events that had occurred between the first observation of mortalities and the day of the exercise. Additional briefing notes were provided to the Local Disease Control Centre (LDCC) controller and the Planning Manager.

The first day of the exercise commenced with an initial meeting of the Incident Management Team at a time immediately after report of the fish mortality incident. Simultaneously, a diagnostic team was dispatched to the farm reporting the fish mortality with two additional teams sent to investigate dangerous contact premises. Each team was met by a role-playing actor who provided details of the farms and animals being inspected. The actor also provided photos of the farm's fish in lieu of the teams collecting samples of fish for laboratory submission.



Trout fry.

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The second session on the first day represented a subsequent time period after laboratory confirmation of the disease had been received and the SDCHQ had decided to proceed with eradication of the disease by slaughtering out the three properties. This second session was extended into the second day to allow completion of each team's destruction and disposal plans. The final session of the exercise represented a time period 7 days later when the surveillance program had revealed that the disease had spread to wild fish in Snobs Creek.

Various inputs (documents, phone calls etc) designed to direct the exercise and introduce particular issues were introduced by the exercise controllers throughout the two days. For each session of the exercise, the exercise controllers had a checklist detailing a pre-determined list of communications and actions that the exercise directing team had identified as necessary components of the response. The checklists included space to record whether each item was completed, the time at which it was completed and whether the jurisdiction needed prompting to complete the item. The checklists were designed based on the response activities described within the VAMAAD and the AQUAVETPLAN Control Centres Management Manual.

The maximum value was extracted from the exercise by using formal debriefing and evaluation methods including both a 'hot' debrief at the close of the exercise, a questionnaire and subsequent opportunities for participants to provide considered feedback via Email to the exercise facilitators. This range of evaluation techniques were designed to determine whether the aim and objectives of the exercise had been successfully addressed and to highlight limitations in the current response arrangements. The debriefing process allowed personal experiences of the participants to be captured and assessed and also allowed an assessment of the qualitative performance of activities i.e. their efficacy and efficiency during the exercise.

Results and Discussion

Exercise Rainbow demonstrated that the VDPI has the staff and expertise to effectively deal with an emergency disease incident in the aquaculture industry. By the end of the exercise, all the necessary plans had been developed for the quarantine of infected properties, the prevention of movement of infected fish and the destruction and disposal of infected fish. Assessment of the exercise concluded that the response plans developed during the exercise would have dealt effectively with the disease outbreaks on-farm but that control of the disease once it had entered a population of wild fish was problematic.

The VDPI manual Victoria's Arrangements for the Management of Aquatic Animal Disease Emergencies proved to be an effective support tool for conducting the response to a disease outbreak. After receiving the pre-exercise briefing material, the LDCC director had prepared specific task lists for each team within the LDCC based on the job cards in the manual and specifically tailored to this exercise. This allowed the teams to rapidly move into their roles.

The relative inexperience of Fisheries Officers in the management of disease incidents was addressed by each LDCC position being held by an Animal Health staff member shadowed by a Fisheries Officer. This worked well with the combined expertise allowing each pairing to effectively and efficiently complete their roles in the exercise. One example of the availability of expert fisheries knowledge provided by local Fisheries Officers was the suggestion that once the disease had spread to the wild fish population, effective control of fish movement by the recreational fishing industry could be most effectively undertaken by the positioning of Fisheries Officers to police movement at local boat ramps.

One failure in this partnering system was where fisheries staff participating in the field teams were uncertain of their responsibilities and powers. For example, they did not impose quarantine on the infected premise or dangerous contact premises during their initial visit. This may be because they were not familiar with the Livestock Disease Control Act 1994. Each field team was lead by a gazetted, experienced Animal Health Officer (AHO) who had the powers to impose quarantine, however he did not. There was no explanation provided as to why these officers did not impose quarantine on the infected premise during the first visit but it may have been due to the fact that the disease diagnosis was not confirmed at that time.

The interaction of Fisheries and Animal Health staff was beneficial to both groups and also identified several areas where the standard procedures used in management of disease events in terrestrial animals are not directly applicable to aquaculture. These included:

- Diagnostic and surveillance teams used both the standard terrestrial 'Animal Emergency Information System' (ANEMIS) forms and the standard VDPI *Fish Kill* forms. Whilst useful, the ANEMIS forms need modification to be directly applicable to aquaculture. For instance, the form should require diagnostic teams to gather information on water source, flow and disposal and whether water discharge can be stopped without adverse impacts on the farm. The source and type of feed used on the farm should also be recorded. The use of one consolidated form rather than the current two would be preferable.
- Imposition of quarantine on properties with a design that includes a flow-through water system (water is taken from a natural waterway, pumped through the farm and discharged back into the natural waterway) is impractical without immediate impacts on the stock. Thought needs to be given to the nature of quarantine and whether it is appropriate to apply quarantine to such properties before diagnosis of an emergency disease is confirmed. If disease is present in a flow-through system, it is likely to have spread downstream before detection of the disease.
- Infection in a wild population of fish introduces problems in the issuing of notices and the control of disease. The owner of such stock is likely to be the Crown and there was uncertainty as to whom the notices should be issued. Some debate as to the roles of the Catchment Management Authority and the conservation management agencies were held without resolution of the issue. This is a larger issue that would also apply to native animals and wild birds with diseases such as avian influenza.



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Planning group working on the map to identify control zones.

Conduct of Exercise Rainbow also highlighted several limitations in the current planning arrangements:

- On several occasions during the exercise, the staff needed to consult the Victorian Environmental Protection Authority (VEPA) and the Victorian Department of Sustainability and Environment (VDSE) to seek advice on issues such as the control of bird access to the infected premises and the use of chemicals for killing fish in open waterways. A VEPA officer on site would have made these consultations easier and quicker. In addition, involvement of the administrative unit responsible for the use of chemicals, the VDPI Chemical Standards Branch in emergency aquatic animal disease responses would also be useful. The LDCC also needed information about the local industry. Although an extension officer was placed in the LDCC to liaise with the affected industry, an industry member within the LDCC would have provided a ready source of such information.
- There was a concern that participants did not file all of the appropriate documents. Communication also raised some issues. For example, the media unit arranged a press briefing prior to the Industry Liaison Officer informing industry members of the disease outbreak. There was a need for greater communication between groups within the LDCC. While the details of some laboratory results were filed without a copy going to the surveillance and tracing teams.
- Thought should be given to include the representatives of affected industry, other government departments eg EPA in the LDCC to facilitate EPA clearance of chemical usage, disposal etc. Other representatives

such as those representing local government may also be appropriate under certain conditions.

Recommendations

As a result of the conduct of Exercise Rainbow and the lessons learned, a series of recommendations were included in the final report. These included:

1. That the VDPI Veterinarians be encouraged to gain experience in the area of fish health to provide additional expertise in the event of a major disease emergency in fisheries and aquaculture.
2. That the VDPI standard operating procedures for emergency disease management of terrestrial animals be reviewed to ensure that these procedures are suitable for use in diseases of aquatic animals.
3. That a list of equipment necessary for the establishment of an LDCC be created and measures undertaken to ensure that this equipment is immediately available for use when a LDCC is established.
4. That the staffing of the LDCC be reviewed to consider inclusion representatives of:
 - A VEPA officer;
 - the appropriate Catchment Management Authority; and
 - a representative of the affected industry.
5. That the fish kill kits provided to Fisheries and Animal Health staff include appropriate laboratory sample packaging for submission of samples.



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A fisheries officer helps release 3,000 endangered trout cod into Ovens River, after a successful 12 year restocking program.

6. That LDCC staff consult other members and teams within the LDCC prior to completing proposed actions.
7. That training of Fisheries staff be reviewed to ensure that they are aware of their powers with respect to emergency animal disease incidents under the *Livestock Disease Control Act 1994* and have greater understanding of chemicals and their uses in disease emergencies.
8. That LDCC staff ensure that, in an emergency, they record all appropriate information and file it as required.
9. That the VAMAADDE be updated on a regular basis and that the discrepancies listed above and any others found be corrected.
10. That the VDPI continues the practice of conducting exercises involving both Animal Health and Fisheries staff to build participants skills in emergency aquatic animal disease management and continue to build relationships between the two groups.
11. That for the purpose of fish disease emergencies, the VDPI appoints specified trained Fisheries staff as Stock Inspectors to provide them with the powers necessary to conduct inspections on properties, impose quarantine of farms and other disease response actions when not accompanied with Animal Health staff.

Outcomes

The planned outcomes achieved from this project were:

1. Increased awareness and ownership of the VAMAADDE within VDPI.
2. More effective emergency response procedures for the control and eradication of emergency diseases in Victorian waters.
3. The integration of various divisions of the VDPI (Fisheries Victoria, Animal Health Operations Branch, regional CAS staff, Chemical Standards Branch and the Office of the Chief Veterinary) in this project establish a working relationship towards dealing with aquatic animal disease emergency outbreaks.
4. Development of increased expertise within the VDPI to conduct and evaluate simulation exercises involving the response to a disease incident in the aquaculture and fisheries industries.

Conclusion

The exercise served to foster a working relationship between the divisions of VDPI that would be involved in the response to an emergency aquatic animal disease incident, and in doing so raised the awareness of government officers to the contribution that each group can make to a combined response team. A number of minor issues were identified during the exercise that, if addressed, would assist in the effective management of emergency disease incidents.

Fisheries Victoria staff received valuable training in emergency disease management principles and familiarity with the job descriptions within LDCC through the training workshops and simulation exercise. Animal Health staff received valuable training in aquatic animals and the aquatic environment. This will lead to improved management of emergency disease events involving aquatic animals in Victoria. This project is generally applicable across other aquaculture and fisheries industries in Victoria as the skills developed by VDPI, in large part, are generic.

The improved efficiency of VDPI ability to detect and manage disease outbreaks has a National benefit for maintenance of trading status through demonstrable animal health programs. Improved control of disease introduction and spread, reduce the risk of serious impacts on the aquaculture industry, seafood market, seafood consumers and conservation of diversity of wild stocks.

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A better future from imagining the worst: land use planning & training responses to natural disaster

March and Henry outline a training approach to complement forward land use planning for natural hazards.

Abstract

This paper argues that it is necessary to move beyond the apparent inevitability of natural hazards by using forward land use planning to significantly reduce their impacts. Land use planning, as a focus for building knowledge and information of various types associated with land, is central to reducing the risks associated with natural hazards. Planning mechanisms offer significant opportunities to reduce both the initial likelihood of natural hazards impacting on human settlements and natural systems, and to reduce the potential consequences of those events that do occur. This paper sets out a training approach that complements forward land use planning for natural hazards.

Introduction

It is a truism to state that natural disasters of various type, magnitude and impact occur periodically. However, few people move beyond the apparent inevitability of natural hazards to consider that forward land use planning can significantly reduce hazard impacts. This paper sets out a training approach that complements forward land use planning for natural hazards. Land use planning, as a focus for building knowledge and information of various types associated with land, is central to reducing risks associated with natural hazards. The inter-disciplinary and varied nature of issues that land use planning must resolve suggest that a hands-on, experiential mode of training is best suited to training people to plan for natural hazard risks. It is argued that this approach draws on the complementary nature of land use planning and natural hazard management, the need to engage communities and to draw on a range of knowledge types, and the location-specific challenges posed by natural hazards themselves.

The paper first examines the main natural hazard threats of relevance to strategic spatial planning, noting that these occur in a spatially diverse, but relatively predictable, manner. It then goes on to examine the nature of forward planning and its ability to reduce the impacts of disaster threats. The paper then provides an outline of Emergency Management Australia's multidisciplinary and experiential approach to training people in land use planning for natural hazards. To begin, the next section examines the fundamental nature of land use planning as a first step to planning for natural hazards.

Land Use Planning & Uncertainty

A simple definition of planning is 'determining a desired future outcome, and then causing that outcome to occur' (Ackoff, 1970). Land use planning, a particular planning type, is focussed upon establishing the best spatial arrangements of land use, development, and management. Paying attention to the future spatial organisation of places allows communities to enjoy the various benefits, and conversely to also avoid the dangers, associated with particular spatial urban and regional circumstances. Planning typically involves trying to achieve particular arrangements of housing, industry, agriculture, conservation, and transportation (Albrechts, 2004: 745; Healey, 1997: 4). To do this, land use planning is confronted with the task of establishing which of the many potential patterns and organisations of land use are likely to be the most advantageous in the future, in a particular place, and for a particular community. In this sense, planning must try and influence ongoing land use decisions towards the most advantageous outcomes (Steiner, 1979: Ch2).

Land use planning, however, is only one of the many forces that act upon land use and management (Bruton, 1974; CEC, 1997: 22). This complicates both the determination of desired planned futures, and the achievement of these desired outcomes. Land owners and managers expect to be able to exercise their

property rights to buy, sell, develop or subdivide land, and typically resist restrictions upon their ability to do this in multiple ways. Various agencies of government focus primarily upon the goals within their particular scope, whether it is provision of roads, street lighting, parks maintenance, education, or reticulated services. Bureaucratic organisations may resist change, adaptation and collaboration. Interest groups maintain diverse, but typically single-issue focuses. In this complex of activity and influences, land use planning must seek to represent 'good' overall decision-making, and to coordinate all these various parties, even while politicians retain final decision making powers.

In addition to the variety of actors in land management settings, land use planning is undertaken in situations of 'imperfect foresight' (Hopkins, 2001). Uncertainty as to population growth, the economic fortunes of nations or regions, changes of political sentiment, or even of climatic changes, erode the ability of agencies to effectively plan. Yet, even while uncertainty adds complexity to the planning task, it is also a fundamental rationale for planning itself. A plan, suitably prepared, provides mechanisms that adapt to and improve changing circumstances. For example, within limits, flexible regulations typically allow market forces to determine the exact detail of land use and development, rather than using rigid controls that are overly prescriptive and quickly outdated. Planning regulations that provide clear objectives without prescribing exact details allow creative designs that 'fit' the circumstances of specific places. Accordingly, good planning is both adaptable and flexible, while increasing certainty where possible.

Even in conditions of partial uncertainty, good planning seeks to allow communities to 'make current decisions in the light of their future effects' (Reeves & Coile, 1984). To make good decisions, the dual nature of planning must be appreciated. On one hand, a 'plan' needs to anticipate future circumstances to the extent that reasonably likely events can be dealt with. On the other hand, a plan must not be too prescriptive, or it will be inflexible and unable to gauge likely future effects. This tension is resolved by a division of land use planning activities. Firstly, forward planning is mainly the establishment of planning provisions, or 'rules'. Secondly, these rules are subsequently used to assess whether proposed actions, such as a residential subdivision, will actually achieve the outcomes we desire for the future.

Accordingly, good land use planning, both plan-making and implementation, establishes and uses regulations that can reduce uncertainty. It is contended that the effects of natural hazards can be anticipated by good land use planning, and the risks associated with these hazards significantly reduced. Before we discuss how this is undertaken, we first turn briefly to an examination of the main hazards of particular relevance to land use planning.



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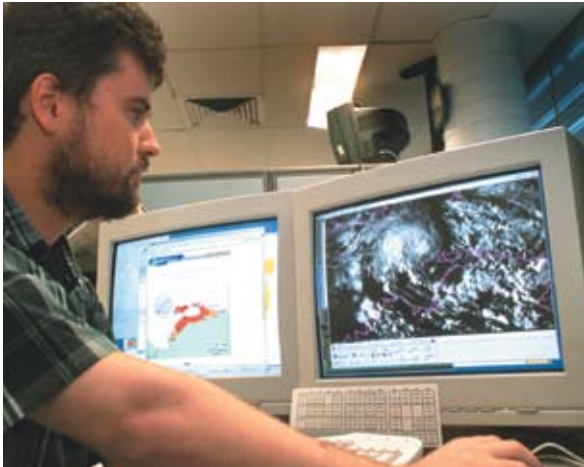
Location-specific nature of hazards is a consideration in disaster land-use planning.

Hazards & Risks

In considering planning for natural hazards, three main aspects of hazards first require attention: the nature of hazards that are of relevance to land use planning; the concept of risk; and the interdisciplinary and location-specific nature of responding to these hazards.

Hazards are considered to be 'sources of potential harm or situations with a potential for loss' (Emergency Management Australia, 2005a). Hazards are the event or phenomenon from which devastating effects originate. Conservatively, the average cost of natural disasters (considering only major events that cause damage greater than \$10 million) to Australia each year is \$860 million (Bureau of Transport Economics, 2001). In terms of impacts and frequency, the predominant natural hazard events across Australia are flooding, cyclones, and bushfire.

On a world-wide basis, floods constitute approximately one third of all naturally occurring disaster events. They cause more than half of the fatalities and more than a third of the economic loss of all natural disasters (Bureau of Transport Economics, 2001; Emergency Management Australia, 2005b). Averaged out over time, costs to the Australian economy each year due to flood events are in the order of \$300 million (Bureau of Transport Economics, 2001). Cyclone events up to Category 5 can occur from November to April in the coastal areas ranging from Perth, to Darwin, to northern NSW. Impacts from cyclones include high winds, storm surge, and flooding. There is a general belief that cyclones may become more prevalent and more intense due to the effects of global warming. The average cost of cyclones is estimated at \$266 million per year (Bureau of Transport Economics, 2001). Bush fires affect many of Australia's most valued farming and natural conservation areas, also commonly being near to



Using electronic means to assess the impact of disasters.

the most densely settled areas. For example, the South East corner of Australia is the most fire-prone area in the World. Fire behaviour ranges from widespread grassfire to intense, hot-burning wildfire. While accurate worldwide estimates of bushfire impacts have not been documented, income and production loss in the Shires of Alpine, East Gippsland, Indigo and Towong from January to May 2003 – following the widespread Alpine fires that summer – is estimated to be \$121.1 million (Gangemi, Martin, Marton, Phillips, & Stewart, 2003). In addition to the above, earthquake, severe storm, and landslip are also important hazard sources.

It is only when hazards are assessed in terms of their likely impacts upon humans or natural systems that their true importance, as risk, is understood. Risk is 'the chance of something happening that will have an impact on objectives' (Standards Australia/Standards New Zealand, 2004). For example, the magnitude of impacts associated with a cyclone over uninhabited areas of the Indian Ocean are scarcely comparable to those that might be expected from a cyclone affecting densely populated coastal urban settlements. Importantly, the concept of risk is inherently associated with conscious recognition and assessment of the likelihood and impacts of a particular hazard. One of the primary challenges of considering and dealing with the risks associated with natural hazards is that they are non-routine. The consequences of hazard events may be high-consequence, but on a month-by-month or seasonal basis in a given place there is often a low likelihood of occurrence, concurrent with a high certainty of occurrence in the long term (Petak & Atkisson, 1982). Accordingly, such hazards are traditionally those for which resourcing and commitment are difficult to obtain because of ignorance, a belief that 'it will never happen here' or at least, 'it won't happen this year'. In fact, the risks these hazards pose typically can be assessed and significantly reduced via land use planning.

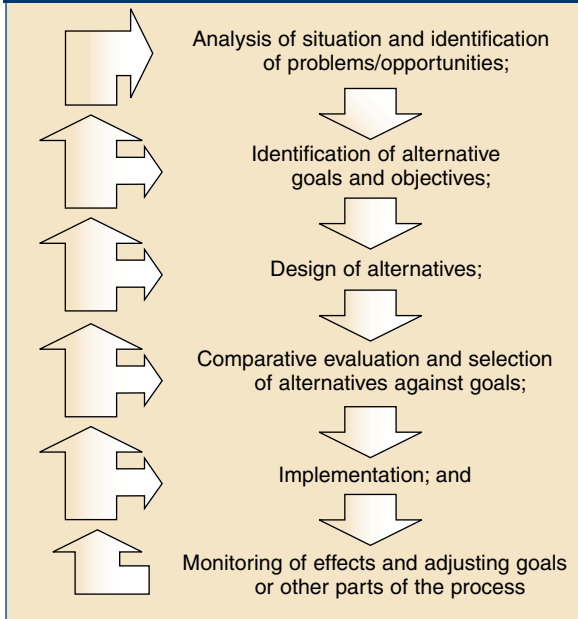
Finally, a key characteristic of dealing with the natural hazards is the proper assessment of risk specific to a particular place, and the activities proposed to be carried out there. Tropical cyclones do not have catastrophic effects upon the southern coastline of Australia. Similarly, the nature of bushfire risk for grazing properties in open grasslands is different to those associated with a residential subdivision in a mountainous sclerophyll forest area. Further, to be able to assess risk in a meaningful way requires drawing upon a range of inter-disciplinary expertise, using and building local knowledge, encouraging inter-sectoral government responsibilities, and focussing this knowledge into action. The next section shows how land use planning can provide a mechanism to undertake this.

Risk-Based Land Use Planning

The move to considering natural hazards in land use planning complements a corresponding shift over time in emergency management itself. Emergency management has evolved over several decades, developing more emphasis on managing and preparing for risk, in preference to solely responding to the consequences of the emergency caused by an event (Tarrant, 2006). The land use planning process provides a medium for the reduction of uncertainty in dealing with hazards, allowing mitigation of their worst effects, and even the remediation of past mistakes. For example, the advantages of a residential subdivision that, while being constructed in a bushfire prone area, includes sufficient vehicular escape and fire fighting routes in various fire event scenarios, refuge and assembly points, setbacks between ignition sources and houses, are hardly comparable with ad hoc development without these features. So while it is uncertain exactly when a fire event will occur in a bush fire prone area, we can be much more certain a community can respond effectively in the very likely case that it will happen at some time. Indeed, the forward planning process may often allow communities and decision makers to determine that certain areas are too risky to be built upon or used for certain purposes.

The most enduring planning process model, both theoretically and in practice, is the Rational Comprehensive Model (RCP). Even while it is periodically criticised or augmented since its first development in the 1950s, no fundamental challenger to RCP has emerged (Hoch, 1984; Levy, 2000: 331; Sandercock, 1998: 86; Yiftachel, 1991: 21). The main steps of RCP are as follows, in Figure 1.

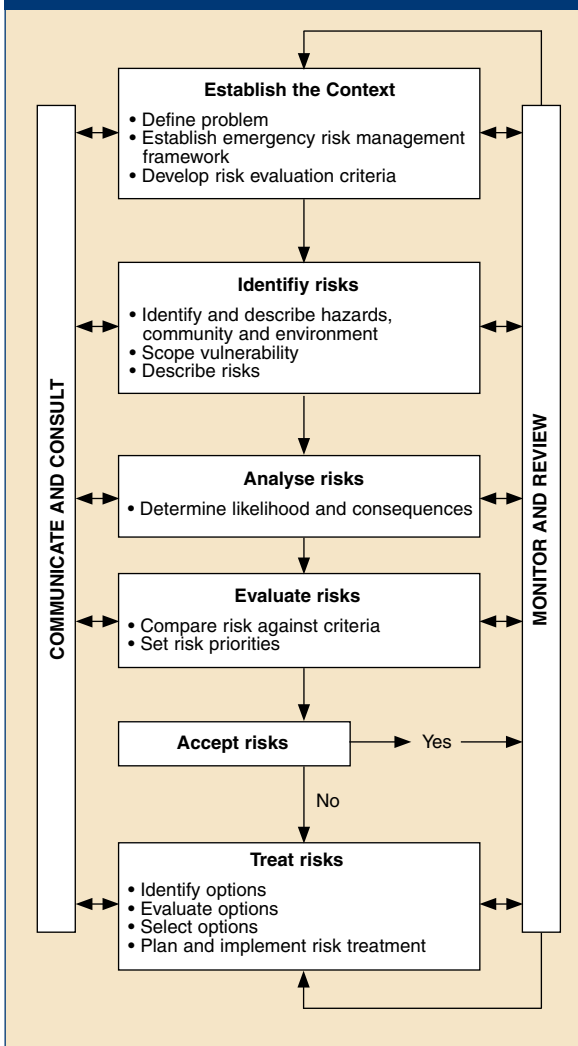
Figure 1: RCP flow chart



The RCP model is intended as a generic approach, that can be adapted and used in a variety of settings for various substantive topic area. Indeed, the procedural approach used by Emergency Management Australia to manage is strikingly similar to the RCP model, as can be seen in Figure 2 below.

The emergency risk management framework has a sound basis in logic and statutory recognition. It has been adapted for implementation in community settings from the Australian & New Zealand Standard for Risk Management (AS/NZ 4360). Indeed, the models for land use planning and emergency management are remarkably similar, making the current movement in emergency management towards evidence-based forward planning highly complementary to land use planning processes. Indeed, it is only through the mechanisms of land use planning that the risks associated with proposed (and sometimes existing) land use and development can be assessed against a range of other considerations, such as ecological values, land affordability, transport planning, community services provision or economic prosperity, to name but a few. Land use planning can act as a central focus for a range of knowledge types revolving around land and spatial concerns (March & Low, 2004). Accordingly, it can also accommodate information and knowledge regarding risks specific to a particular place, and to a specific community. This knowledge base is interdisciplinary, and must engage with all the trade-offs and issues that planning embodies, while also providing a base for disseminating knowledge in communities. Accordingly, land use planning, as a series of informed decisions, can incorporate and build knowledge about natural hazards in seeking to reduce uncertainty in communities. This reduction in uncertainty plays out along two related dimensions. Firstly, it can decrease the likelihood of hazards causing harm in the first instance, say for example, by determining that a development should simply not occur in certain high risk bushfire locations. Secondly, planning can modify the design and quality of settlements, which of course can never be completely free of risk in any case, so that the consequences of events, if they occur, are reduced.

Figure 2: EMA Steps in the Emergency Management Process



Training Responses

The nature of land use planning for natural hazards suggests that particular training approaches are required. The fundamental rationale used by Emergency Management Australia (EMA) conforms to the main practices of experiential learning theory (ELT), where relatively abstract ideas, such as the need to plan for risk, are transformed into concrete experiences, experimentation and skills, which the participant can then understand even more fully upon subsequent reflection (Kolb & Boyatzis, 2000). Accordingly, EMA provides structured and hands-on adult training and educational



Floods constitute approximately one-third of all naturally occurring disaster events.

experience. Participants from roles such as local and state planning agencies, state emergency services, bushfire planning and response, and floodway management agencies, are invited to apply throughout Australia.

Participants are initially introduced to the ideas of planning for risk, and are encouraged to contribute their own understandings and perspectives, typically starting from, and then comparing, their disciplinary backgrounds. They are then trained to use the ERM framework in simulated decision-making environments. The primary focus of participants' work is the preparation and justification of AMCORD-based planning controls that account for natural hazards on the basis of reasoned assessments of risk.

Role-play scenarios, in which participants may be required to take on roles that are unfamiliar, develop an appreciation of the actual challenges of spatial planning for risk. They are challenged to establish planning scheme 'rules' specific to locations, ex ante, or in preparation for future possible development pressures. In preparing risk based planning controls, participants are exposed to a number of experiences which prepare them for the application of ideas to real life situations. To justify their planning controls they must use an evidence-based process. Participants gather data, prepare planning tools, consider public and developer expectations, and political decision-making environments. Their controls must draw together key planning functions and non-planning functions to identify existing and potential risks and make informed decisions. The participants' planning provisions are then subsequently used and 'tested' as the basis of development control for land use proposals and the coordination of various interests and activities beyond natural hazard management.

Participants leave the course having practised new and enhanced skills in a "safe" educational environment,

as well as having challenged, and been challenged by, different ideas, points of view, and methodologies. Training in a residential program, where participants stay on-campus for a number of days, allows for formal and informal networking across disciplines, particularly those in emergency response and land use planning. Drawing together participants from each state also allows the exchange of ideas and examples between organisation types and functions. A subsequent critical reflection assignment when they have returned to their normal work environment encourages deeper understandings, and the transference of understandings into actual practice. The Risk-Based Land Use Planning program is nationally accredited and results in participants receiving a Statement of Attainment once they have completed the related assessment. It is also accredited by the Planning Institute of Australia as contributing to Continuing Professional Development.

Conclusions

To move beyond the apparent inevitability of natural hazards, this paper has argued that land use planning is an important mechanism for the reduction of risks in the built and natural environment. The social process of gathering evidence for decision-making in spatial planning provides an opportunity to build and disseminate a knowledge base in the related areas of spatial planning, emergency management, and emergency risk management. The planning process can also provide an opportunity to coordinate policy areas and integrate sound risk management practices into spatial planning.

However, the particular qualities of land use planning and natural hazard risk assessment require that training be undertaken in particular ways. It is suggested that skills in dealing with the inter-disciplinary and locally specific character of natural hazard management are

best learnt via a hands-on, experiential mode of training. This approach allows participants to experience and resolve the tensions that arise in planning between competing issues and natural hazard risk, the need to engage with communities, to use evidence-based reasoning, and to cross disciplinary and agency boundaries.

Using a risk management framework for understanding and informing spatial planning can produce sensible and balanced options for treating risk. The framework and its associated processes also embeds ownership for various risk treatments, assigned timelines for the treatment processes, and a vehicle for two-way communication with interested parties and the general community.

Planning regulations and controls that are developed through exhaustive and thorough consultation represent consolidated understanding of the concerns and perceptions in communities. In combining the processes used in spatial planning and emergency risk management, the complementary 'fit' of both processes allows risk to be managed in an embedded way as part of wider planning processes.

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Measuring emergency services workloads at mass gathering events

Zeitz et al maintain better information management can improve emergency workload planning at large public events

Abstract

This research measures and compares emergency services workloads and identifies factors that contribute to workload in serving the general public at mass gathering events. It derives from a collaborative project involving all emergency services that assisted at major events held in South Australia during 2003/2004. In collating workload measures for different emergency services, this research sought to ascertain if variables such as weather, crowd type and nature of an event assist in predicting the workload, across the service providers.

Over 5.7 million patrons attended major events in this period. Weather arises as a primary determinant of South Australian police workload. For SA Ambulance Service and St John First Aid Service there is a broader range of determinants. There are also examples of event specific determinants. The workloads for ambulance and police correlate but there is no correlation between St John workload and the other two emergency services. The level of staffing by both ambulance and police correlated closely with the workload of each group, while for St John, no such relationship was observed. The main recommendation from this research is the need for higher quality information management across emergency services.

Introduction

Contemporary Australian lifestyle is reflected in the large number of public community events that are held across the continent. Emergency service providers play a pivotal role in ensuring public safety in these unique temporary communities. Resource allocation to mass gathering events is generally based on experience and historical knowledge of events retained by individuals.

There is a need to make resource allocation at mass gathering events more closely mirror actual (predicted) needs [Arbon 2002], and further studies are required to inform the decision making process.

There are a number of differing views regarding the definition of mass gatherings [Arbon 2002:60]. Mass gatherings are events that are planned [Gaffney 2005] and organised [Milsten et al 2002]. Various authors have defined mass gatherings as events with attendances exceeding 1000 persons [De Lorenzo 1997, Parillo 2004] through to 25,000 [Milsten et al 2002]. An alternate definition proposed by Arbon [2004:210] states "a mass gathering is a situation or event during which crowds gather and where there is the potential for a delayed response to emergencies because of limited access or other features of the environment or location". In addition there is an increased risk that these gatherings may result in emergencies of their own accord. Mass gatherings in this study were defined as events that were planned in advance with a crowd size of at least 25,000.

The body of knowledge regarding mass gathering medicine has a focus on reviews of singular events [Arbon, 2004] with minimal analysis [De Lorenzo 1997]. Workload at mass gatherings has traditionally been measured in terms of usage rate, based on the number of people treated and the number of people present [Zeitz et al 2002, Arbon 2002, Milsten et al 2003]. There is a broad range of patient presentation rates (PPR) for mass gatherings, due to the diverse nature and location of events with PPR ranging from 0.14-90/1000 [Milsten et al 2002]. Despite a growing body of knowledge about medical service provision for mass gatherings [Zeitz et al 2005], and emerging tools to predict workload, there is very little data "available from which to plan the emergency medical needs for public events" [Parillo 2004].

In the non-medical literature the goal of event organizers and service providers has been described as "a safe and trouble-free celebration" [Bennett 1998:24]. The role of police at events has been described as policing of the law and regulations, communication with other agencies and the co-ordination of an emergency response in the



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St John ambulance tending to a jogger at a sport event.

event of a serious incident [Speed 1993]. Concerns have been raised due to the limited involvement of police in event planning. Speed [1993] argues that large public events cannot be managed by a single agency but need to have a multi agency planning team. It has been suggested that police should not be the lead authority, as they have a more response-based focus, whereas emergency management planning needs to focus on prevention and preparedness [Davies 1998].

Whilst the literature contains information on medical workload this does not extend to other emergency service requirements. What is missing from the literature is evidence supporting the guidelines presented in the variety of 'how to' manuals [EMA 1999, Health and Safety Executive 1999] that address medical care and other emergency service provision at mass gathering events. "Data collection from mass gathering events must now also be given priority. There is urgent need for an easily accessible database that will allow event planners to look back at the history of events that have taken place" [Hines 2000:150].

The identification of variables that impact on workload across Emergency Services is important in determining resource allocations that adequately meet the day-to-day activities of the emergency services. Greater understanding of emergency service capabilities allows for more definitive planning for resource allocation and in turn ensures effective and efficient use of these resources.

The purpose of this research was to measure and compare workloads of various emergency services at mass gathering events and to identify factors that impact on workload.

Method

This prospective, descriptive statistical review of the workloads of emergency services at mass gathering events was a collaborative project supported by all emergency services in the State of South Australia (as represented by the authors' affiliations). Representatives from each emergency service participated in the project forming research team (the authors). The group determined the events to be captured, the information required for profiling the event, and the data collected to measure workload for each of the emergency service. Table 1 summarises the data collection framework. Some less obvious determinants of work that have been described by Arbon [2002] included if an event was bounded in that it was fenced or contained in a defined area versus events such as pageants that covered a large area and multiple entry points, and the mobility of the crowd defined by events with limited seating or crowds were predominately standing. Age of the crowd was measured by age brackets 0-15, 16-35, 36-65 and 66 years or older. The calendar years 2003 and 2004 were selected so prospective information could be collected and to provide a greater depth of data than a single year analysis.

In South Australia there is a state-wide Emergency Services Major Event Coordinating Committee (ESMECC) and it was decided to include all events that are coordinated through this committee. Profiling data was collected from event organisers, event websites, emergency service operational plans, emergency services operational personnel and expert knowledge of the research group.

Table 1: The Data Collection Framework		
Events Captured	Event Profile Information	Workload Measures
All events coordinated through the Emergency Services Major Events Coordinating Committee (ESMECC) for 2003 and 2004.	Weather – daily maximum temperature and humidity.	South Australia Police – Arrests and reports and personnel hours.
All Australian Football League Competition Matches held at the AAMI Stadium due to the large crowd sizes (range 20,000 – 55,000).	Crowd size and profile – based on police estimates, gate turnover and/or ticket sales with subjective crowd descriptors determined by the research team i.e. age distribution and behaviour.	State Emergency Service – Incidents and duty hours.
	Profile of the event – including if it is bounded or extended, indoors or outdoors, seated or mobile crowd [Arbon, 2001] and type of concerts i.e. heavy metal, classical.	St John Ambulance – Casualties treated and duty hours SA Ambulance Service – Patients evacuated to hospital and personnel hours dedicated to the event.
	Nature and duration of the event – for example presence of alcohol and/or drugs, sporting event and length of event i.e. number of hours - number of days.	Metropolitan Fire Service – Incidents and personnel hours Country Fire Service – Incident information and volunteer standby hours.

Emergency services were asked to provide information describing their measures of work. Each organisation collated and supplied raw data on organisational workload. Data collation and entry was by a single operator. Workload for SAAS comprised tasking, i.e. dispatch of an ambulance to the event, irrespective of whether or not there was subsequent transport of a casualty to hospital. For St John, workload was defined simply as the number of patients presenting for treatment, whereas for police, workload included the composite of arrests, evictions from the event and reports. The State Emergency Service and both the metropolitan and country fire services incidents recorded and personnel hours tallied were the designated workload measures.

Statistical analysis involved analysis of all data, seeking determinants of workload, both for individual services and combined workload of all emergency services. Continuous data were analysed using linear regression with normalisation of non-Gaussian data as appropriate. Categorical variables were analysed by single factor analysis of variance. Significance was determined by a p value of < 0.05.

Results

In the data collection period, there were 19 different event types and 35 events in total. There were 156 event days referring to the number of days events occurred. For example the Royal Adelaide Show is a single event type but accounts for 9 event days per year. Overall the total crowd size in attendance for events over the 2-year period was estimated at 5,797,086 patrons. The average crowd size (where known) per day of event

was 40,824 with the median size 33,600 (range 2275 - 325,000). The average temperature at the start of the event captured was 17.5o Celsius (range 9 - 32) and 17oC (range 7 - 32) at the finish of events. Average daily maximum temperature for event days was 21oC and minimum was 13oC. Average humidity was of 59% (range 13 - 94). Crowd mood was described as passive, active or energetic with the project group determined the mood of the crowd for each event type. Of the 19 event types, 4 crowds were considered passive, 7 crowds were active and 8 energetic.

There were two distinct groups of emergency service providers. First were the services that were only required for specialised support at specific events. The State Emergency Service (SES) and both the metropolitan and country fire services attended only a few major events. Table 2 shows the service and number of days for which these organisations provided support. The Country Fire Service (CFS) provided an average total of 448 hours per year (320 in 2003 and 576 in 2004) with no specific incidents recorded. The Metropolitan Fire Service (MFS) attended very few incidents over the 36 event days. They supplied 1394 personnel hours both operationally and in operations command. For the four major events SES attended annually there were no specific incidents recorded with 4474 personnel hours registered. Due to the minimal number of incidents recorded by these three services they were not incorporated in the subsequent workload analysis.

The second group were the core services in attendance at the majority of events. There was a comparatively higher workload for St John First Aid Service, SA

Table 2: Events and number of event days attended by the CFS, MFS and SES

Service	Event Days
Country Fire Service	21 days
Metropolitan Fire Service	36 days
State Emergency Service	20 days

Table 3: Number of event types and days attended by SAAA, SAPOL and St John

Service	Event Types	Event Days
SAAS	17	114 days
SAPOL	19	135 days
St John	13	109 days
Total	19	156 days
Data for all 3 services	13	106 days

Ambulance Service (SAAS) and South Australia Police (SAPOL). Table 3 summarises the event numbers data were collected from. Of the 156 event days, there were 106 days attended by SAAS, St John and SAPOL for which detailed workload data was available.

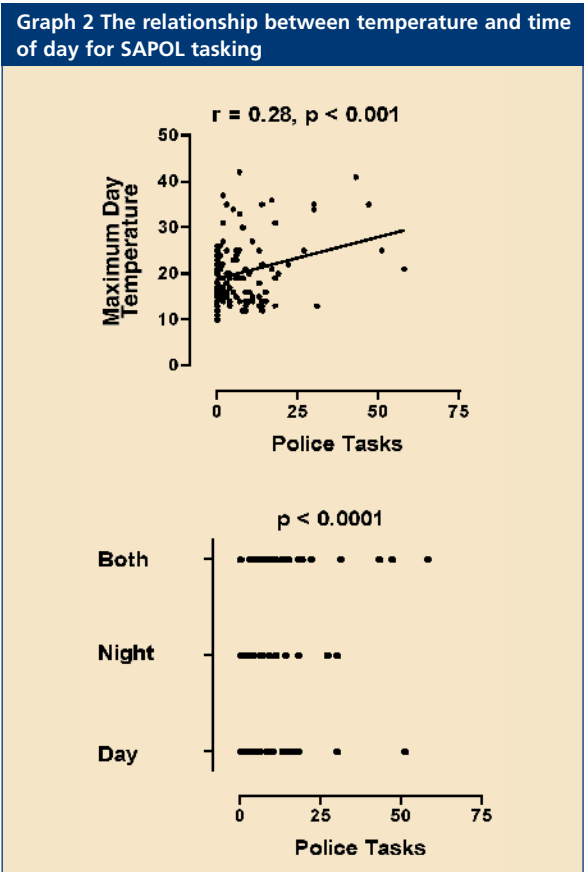
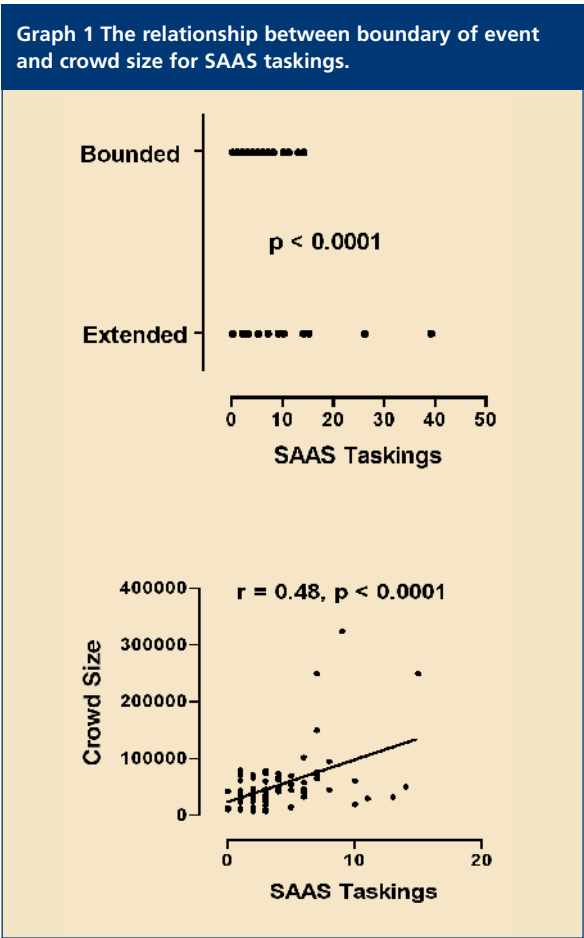
Determinants of Workload

Following collection and definition of all workload data and collation of all crowd and event profile data for each event day, the determinants of workload for each service were analyzed.

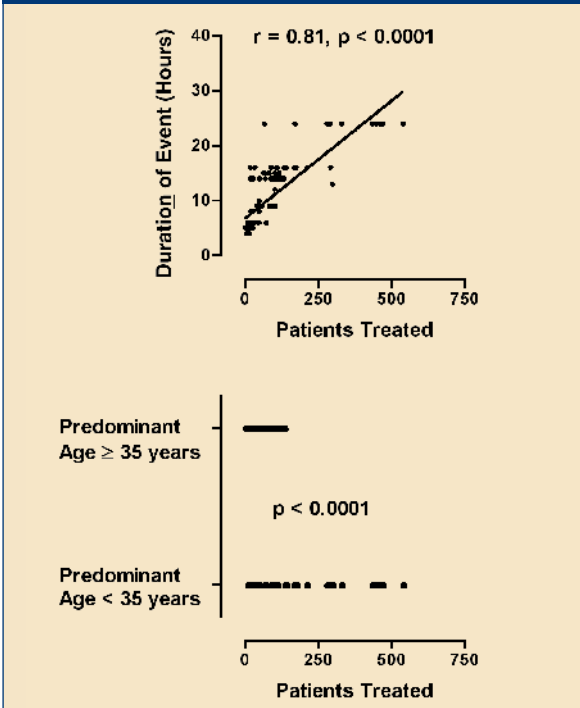
For SAAS (see Graph 1), (event days = 114) the determinants of work, in order of importance were:

- If an event was bounded
- Crowd size
- Crowd mood
- The type of event (sporting, entertainment or community event)
- Younger age brackets of the crowd
- Availability of alcohol
- Weather – Minimum temperature & humidity
- Smoking at event

SAPOL workload was influenced by two determinants of workload. In order of importance for 135 event days these were weather (maximum temperature and humidity) and time of day the event was held. Graph 2 presents the respective plots of this for police.



Graph 3 The relationship between duration of event and age of crowd with patients for St John tasking.



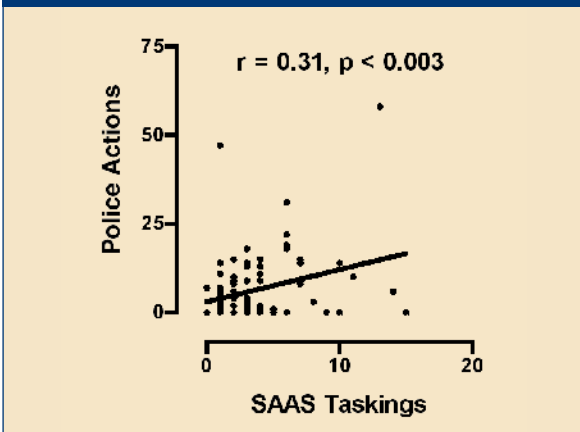
The determinants of workload for St John (Graph 3) for 109 event days, in order of importance were:

- Duration of the event
- Younger age brackets of the crowd
- Event type (sporting, community, entertainment)
- Availability of alcohol
- Mobility of crowd
- Time of day
- Smoking at event
- Day of the event
- Minimum temperature

Combined Events

There were 100 event days for which data on workload for St John, SAAS and SAPOL were complete. The workload for SAPOL and SAAS were correlated ($r = 0.55, p < 0.0001$) suggesting similar determinants of workload. While activity from events on New Year's Eve substantially strengthened the association, a modest positive correlation persisted even when these event days were excluded (Graph 4). However, neither service's workload was correlated with the activities of St John.

Graph 4: The relationship between event workload for SAAS and SAPOL.



Comparison of Emergency Services Workload

In order to assess the impact of various measured parameters on the overall combined workload of emergency services, a means of combining data was required. This was achieved by ranking the workload of each service (from 1 to 106) for each of the events i.e. the event day resulting in the lowest workload for SAPOL was ranked at 1 while the event day resulting in the highest workload was ranked as 106. The ranking for each service; SAPOL, SAAS and St John, was then added to produce an overall measure of combined workload for emergency services. The significant determinants of workload in order of importance were:

- A mobile crowd
- Events with a component inside
- Time of day for the event (increased work at night)
- The longer events
- Smoking at the event
- Events held on a weekend
- Event type (community events have highest workload)
- Larger the crowd size
- Predominantly young crowd less than 35

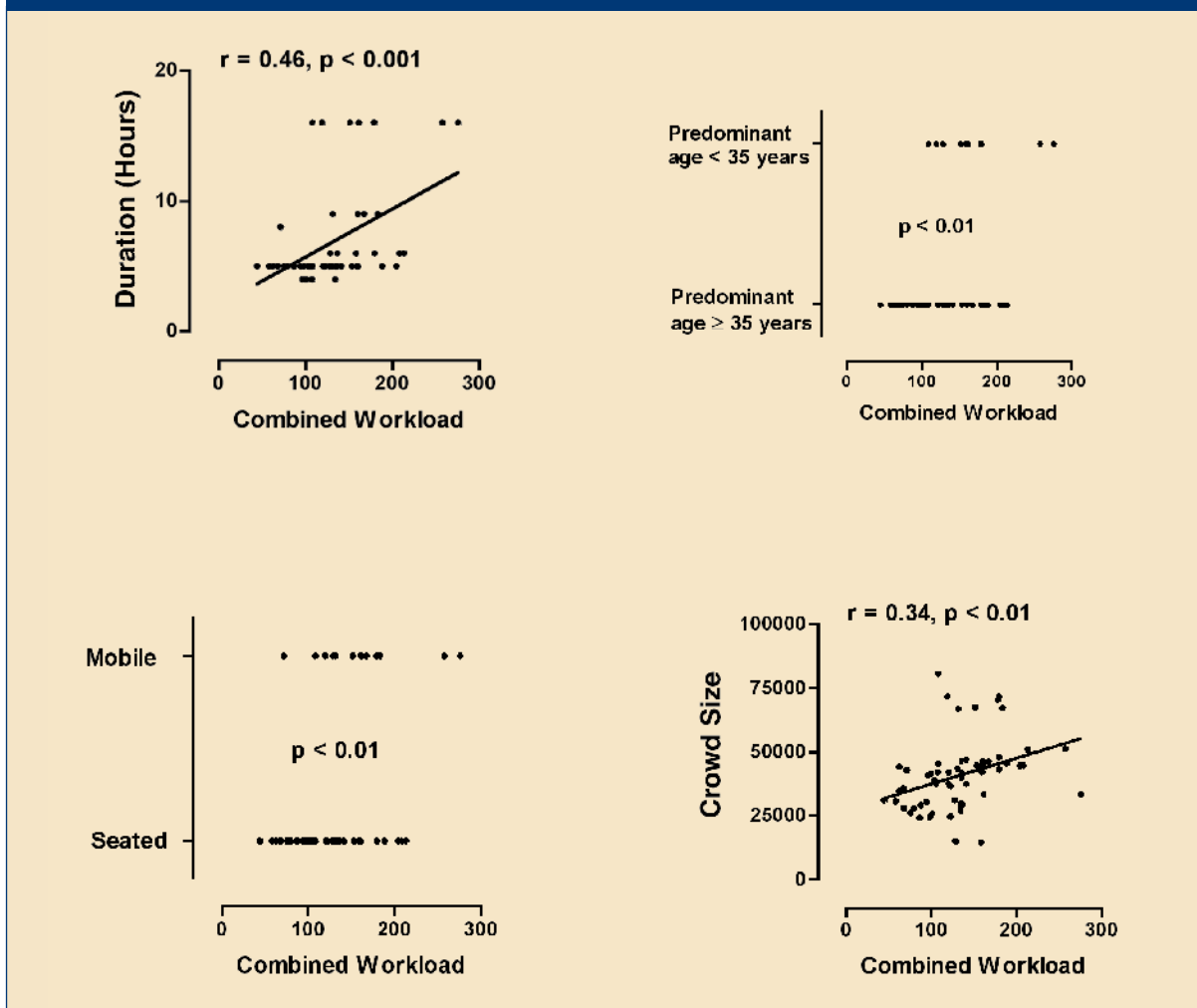
The more important factors are demonstrated graphically in Graph 5.

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Staffing levels are an important consideration at mass gathering events.

Graph 5: The relationships between various event factors and combined emergency services workload.



Personnel Hours

For each of the main emergency services, the number of personnel present during the event was determined by taking the total number of duty hours worked for the event, and dividing this by the duration, in hours, of the event, providing an average number of personnel available for each hour of the event. This figure was then compared with a number of variables that might be expected to have an impact, the data being displayed in Table 4. Only the type of event (sporting, community or entertainment) was a common factor for determining staffing levels for all services.

Crowd size and bounded events were important determinants of staffing levels for SAAS and SAPOL, but not for St John. A young mobile crowd influenced staffing by SAPOL and St John but not SAAS. The level of control of alcohol was not a significant factor in influencing staffing levels. Of interest, the level of staffing by both SAAS and SAPOL correlated closely with the workload of each group while for St John, no such relationship was observed.

Discussion

This project has established a comprehensive and substantive database of information relating to mass gatherings held in South Australia in 2003/2004. The key finding of this study is that, despite differing roles at mass gatherings, core emergency services (SAPOL, SAAS and St John) have very similar determinants of workload. CFS, MFS and SES supported events in a number of different roles and had less definitive workload measures and a significantly reduced measurable workload captured as incidents. For these services, the major role relates to either a preventive role or being on standby in case an incident occurs. It is particularly the case for fire services that, while the risk of an adverse event is obviously low, the ability to respond rapidly at a large mass gathering is an overriding consideration. While traditional determinants of workload proved predictive in the present study, such as crowd size and weather, it nevertheless remains possible that there are factors important to the determination of workload that were not measured or collected during this project.

Table 4: Personnel hours and variables influencing workload

	SAAS	SAPOL	St John
Crowd Size	r = 0.60 p < 0.0001	r = 0.56 p < 0.0001	NS
Event Type	p < 0.05	p < 0.0001	p < 0.01
Alcohol Present	p < 0.05	NS	NS
Young Crowd	NS	p < 0.0003	p < 0.01
Mobile Crowd	NS	p < 0.0001	p < 0.01
Bounded Event	p < 0.0001	p < 0.0001	NS
Workload	r = 0.65 p < 0.0001	r = 0.47 p < 0.0001	NS

NS = No significant correlation observed

The time of day the event was held (day, night, or day/night) was the only determinant of workload for SAPOL, indicating the onset of night as being a particular factor for police. The nature of the event was an important determinant of workload as was a younger crowd demographic for police ambulance and St John. This is consistent with the experience of these services that younger crowds and patrons are more likely to access medical services at events. While this may reflect the nature of medical incidents at events, it remains possible that older patrons make a choice to leave the event if they are unwell and seek attention away from the event. The availability of alcohol was a significant factor in determining medical workload but, interestingly, did not impact on the workload of SAPOL. While the smoking status of events appeared to impact on medical workload, it is likely that this is simply a confounder for some other aspect of the event determining workload.

Mobile crowds generated more work for emergency services than seated crowds and this probably reflects a longer duration of events for mobile crowds. Longer events and events held on weekends produced a greater workload for services but crowd mood did not. While it is likely that overall crowd behaviour is different during the week compared to weekends, it is apparent that a simple measure of crowd mood does not detect this difference, the difference only being apparent based on day of the week. Crowd size and duration of the event were consistent determinants of workload, consistent with the published literature in this area.

The workloads of SAAS and SAPOL correlated with each other but not with St John. This is the first report to show that diverse emergency services have similar determinants of workload. The majority of previous literature relates to medical workload but we have now observed that the factors determining medical workload are indeed similar to those determining the workload of SAPOL. Correlation between staffing and workload occurred based on event days. The level of staffing by

both SAAS and SAPOL correlated closely with the workload of each group while for St John, no such relationship was observed. This is an important observation as both SAAS and SAPOL have paid employees whilst St John members are volunteers. This suggests that over time SAAS and SAPOL, constrained by fiscal considerations, have become adept at determining the level of presence most appropriate for different major events. Furthermore, both SAAS and SAPOL have other resources that can be readily be mobilized in the case of an extraordinary event.

While St John has the largest measurable workload, staffing levels do not match workload. This appeared largely due to excess staffing at some events rather than inadequate staffing levels. This likely reflects the voluntary nature of St John activity but nevertheless has implications, as even volunteer resources are limited in supply. The exploration of the utilisation of volunteers for St John at major events is warranted.

This research has measured and compared the workloads of emergency services at mass gatherings in South Australia over a 2 year period. It demonstrates similar workload determinants for core emergency services. Priorities for the future include: the development of information systems to monitor emergency services workload at mass gatherings to inform decision making about the level of emergency services that should be provided; more comprehensive longitudinal studies of workload determinants for emergency service providers to support the development of predictive models; the development of mass gathering key performance indicators and benchmarks locally, nationally and internationally; the development of a greater understanding of the relationship between emergency services staffing and safe mass gatherings; opportunities to research law and order work at mass gatherings and best practice utilisation of volunteers to manage workload at mass gathering events.

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Fighting fatigue whilst fighting bushfire: an overview of factors contributing to firefighter fatigue during bushfire suppression

Aisbett and Nichols explore the physiological factors contributing to firefighter fatigue while fighting bushfires

Abstract

Aching muscles and joints, lethargy, and sleepiness are all signs of firefighter fatigue during bushfire suppression (Figure 1). If not managed, fatigue may lead to injury or illness for the individual, which may also compromise the safety and productivity of their crew. Understanding the many sources of firefighter fatigue is, therefore, fundamental for all Australian fire agencies. This article will briefly address several factors thought to contribute to firefighter fatigue including; sleep loss, firefighter's work activity, their hydration, and nutrition, the hot and smoky working environment, firefighter's physical fitness and their experience. This brief overview draws on findings from firefighting research and the broader scientific literature.

Introduction

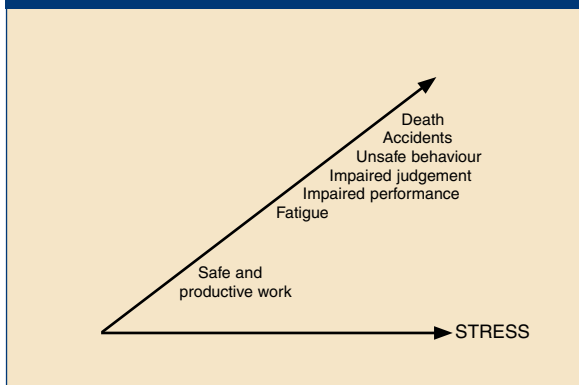
Fatigue can be defined as a reduction in physical and mental work capacity, resulting from physical or mental load(s), that is reversible with rest. On the fireground, obvious symptoms of firefighter fatigue include aching muscles and joints, lethargy, reduced work output, sleepiness, and trouble concentrating (MTDC, 2003). These symptoms are often the first clear indication that the firefighter is suffering escalating strain in response to fireground stress (Figure 2). Stress is defined as the physical, mental, or environmental load imposed on the firefighter (Budd et al., 1997a). Common sources of stress on the fireground include smoke, the intensity and duration of the work, and heat from firefighter's exertion, the weather, and the fire (Budd et al., 1997a). The strain experienced by firefighters can include physiological responses such as elevated heart rate and sweating and subjective responses such as increases in perceived exertion and thermal discomfort (Budd et al., 1997a). Under sustained or increasing stress, fatigue may quickly lead to impaired work performance and judgment, unsafe behaviour, accidents (i.e., injury), and in very rare cases death [Figure 2 (Budd et al., 1997a)]. Sustained fatigue on the fireground can also increase firefighter's risk of illness (Ruby et al., 2002b). Injured or ill firefighters compromise the wellbeing of their crew, their crew's fire suppression objectives, and potentially, the protection of people and property by the affected crew. Understanding and managing fatigue on the fireground is, therefore, a critically important issue confronting fire authorities and land management agencies across Australia.

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Figure 1: Fatigued Australian firefighters following a bushfire suppression shift.

Figure 2: A model of stress and strain during bushfire suppression. Adapted from Budd et al. International Journal of Wildland Fire, 7, 69-76. Reproduced with permission from CSIRO PUBLISHING, Melbourne Australia.



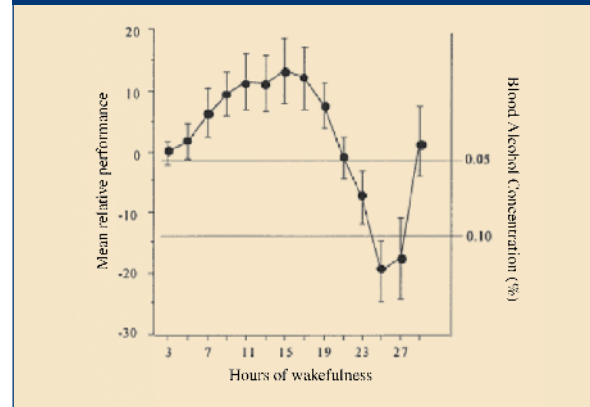
Sources of Fatigue for Australian Bushfire Fighters

Firefighter fatigue during bushfire suppression can arise from a number of sources. The current overview will outline the relationship between fatigue and sleep, before focusing on the impact of firefighter's work activity, hydration, and nutrition before, during, and after their fireground shift has on firefighter fatigue. The influences that heat (from the weather, fire, and physical work), smoke, fitness, and experience each have on firefighter fatigue will also be briefly addressed. A detailed reference list is provided for readers interested in pursuing specific issues in greater depth.

Sleep

Sleep loss is a major cause of fatigue and is thoroughly reviewed elsewhere (Dawson & McCulloch, 2005). Briefly, the specific symptoms include forgetfulness, poor concentration and mood swings, and lethargy (MTDC, 2003). Sleep loss is, accordingly, more related to psychological and emotional fatigue rather than a reduction in work capacity (MTDC, 2003). Indeed, United States Forest Service (USFS) seasonal firefighters work output was not strongly related to the number of hours they slept the night before (Ruby & Gaskill, 2002). Extended sleep loss can, however, impair decision making to the same extent as blood alcohol concentrations that exceed 0.05% [Figure 3; (Lamond & Dawson 1999)]. Australian volunteer firefighters who perform a full fireground shift after completing their normal employment may be especially vulnerable to the negative effects of 'sleep loss fatigue'. Fire agencies may consider implementing shorter shifts for first responders at incidents that will require multiple shifts and crews. Restricting the shift length for volunteers who may have already completed a half or full days' employment may limit the time they have to stay awake and reduce the likelihood of bad decisions induced by sleep loss fatigue. Dedicated research into the interplay

Figure 3: Mean relative mental performance with sustained wakefulness compared to different blood alcohol concentrations. Adapted from Lamond and Dawson. Journal of Sleep Research, 8, 255-262. Reproduced with permission from BLACKWELL PUBLISHING, Oxford, United Kingdom.



between firefighter's sleep patterns, their work output, physiological, and subjective responses during bushfire suppression is, however, required before changes to shift lengths can be implemented.

Work Activity

The intensity and duration of fireground work is a major source of stress for bushfire fighters (Budd et al., 1997a) and, hence, is a key factor in firefighter fatigue. For the Australian volunteer firefighter, this fatigue may be compounded by the work they do in their normal employment before turnout. The effect that their outside work has on the fatigue they experience during bushfire suppression has not been directly evaluated. Research using USFS seasonal firefighters indicates that firefighter's daily work output was strongly associated with the incidence of physical fatigue during their next day's shift (Ruby et al., 2002a). Though yet to be investigated, it is likely that Australian volunteers with more physically demanding jobs will experience more physical fatigue (i.e., reduced work output) during bushfire suppression. Alternatively, those firefighters with more mentally demanding employment may be prone to tiredness and trouble concentrating during their bushfire suppression shift. Crew leaders may need to consider firefighters' pre-shift activities before assigning specific duties on and off the fireground. Individual firefighters also need to recognize their own fatigue levels before turning out or volunteering for particular roles at an incident. Research into the relationships between firefighters' outside employment and their work output, physiological, and subjective responses during subsequent bushfire suppression shifts is, however, required before firm conclusions on this issue can be made.

No one has evaluated the physical demands of suppressing bushfires using water and other liquid suppressants delivered by fire hoses connected to fire trucks (i.e., tankers). The study of work activity is difficult for researchers due to limited access to firefighters prior to their shift and problems collecting valid work and physiological data in remote locations without interfering with the firefighter's work. Our laboratory has employed portable global positioning units, heart rate, and physical activity monitors to measure the work patterns and energy expenditure associated with individual firefighters undertaking tanker-based suppression of Australian bushfires. The units can be worn under firefighter's clothing (Figure 4) and collect data throughout a fireground shift without disrupting their suppression duties.



Figure 4: Portable global positioning system (inside blue pouch), heart rate, and activity monitors (connected to black horizontal strap) enable measurements of work patterns and energy expenditure during bushfire suppression without disrupting firefighter's work.

Preliminary data from the 2006-2007 fire season indicates that tanker-based bushfire fighting is an intermittent activity with brief periods of intense work separated by lower levels of activity. During a typical (10.2 ± 2.1 hr) shift, firefighters ($n = 42$) spent $21.7 \pm 18.4\%$ of their time traveling in the tanker. On the fireground, they covered 15.6 ± 5.5 km on foot at an average speed of 1.7 ± 1.0 km·hr⁻¹. During their shift, the firefighters' average heart rate was 101.2 ± 12.6 beats·min⁻¹ [$54.4 \pm 5.0\%$ of age-predicted maximum heart rate (HR_{max})], whilst their peak HR was 169.0 ± 17.8 beats·min⁻¹ ($92.0 \pm 9.2\%$ HR_{max}). The average and peak heart rates are considered 'moderate' and 'very hard' respectively by the American College of Sports Medicine (ACSM). The peak heart rates are consistent with the demands experienced during periods of charged hose advance (Bennett et al., 1994, Gledhill & Jamnik, 1992) and 'normal' to 'fast' rake hoeing (Brotherhood et al., 1997a). Such intense bursts of effort can lead to the accumulation of chemical compounds (including potassium, lactate, and hydrogen

ions) in the muscles and blood which are thought to impair physical performance (Westerblad et al., 2002) and contribute to subjective perceptions of fatigue (Noble & Robertson, 1996). A rapid acceleration of blood pressure and heart rate accompanying a brief, intense exercise session may also put some firefighters at increased risk of cardiovascular distress (Balady et al., 1998). Firefighter fatigue may not only arise from intense, intermittent work bouts but also from the long duration of their fireground shift. Unpublished data from our laboratory has shown that, in 95% of cases, Australian rural firefighters work for between 8.5 to 12 hours. The energy expended during this time is yet to be determined. During typical 12 – 18 hour shifts, USFS firefighters expend a similar amount of energy as elite marine units and US swimmers during training camps (Ruby et al., 2002c). Firefighters with the USFS primarily use handtools (e.g., rakes, chainsaws) to clear combustible fuel (e.g., small shrubs, plant litter) to create fire breaks of bare earth to curtail the spread of the fire. Fundamental differences in movement patterns between this type of suppression work and that performed by tanker-based fire crews (Figure 5) limit the application of findings from the USFS to the Australian volunteer tanker-based firefighter. There are also considerable differences between Australian volunteer firefighters and the seasonal firefighters employed by the USFS with respect to age, demographics, and physical condition (i.e., health and fitness). Further investigation is required before the energy expended by tanker-based fire crews can be quantified. Without this knowledge, the hydration and nutritional requirements for Australia's volunteer bushfire firefighters cannot be determined.

During campaign fires, fire crews frequently undertake multiple fireground shifts in consecutive days. Shift work schedules are likely to accelerate the fatigue that firefighters experience in a single shift and predispose the individual to fatigue-related injury and illness. Indeed, research from the USFS indicates that consecutive days of intense or prolonged fireground work suppress firefighters' immune systems, increasing their chance of illness (Ruby et al., 2002b). Alternating 'easy' (< 8 hr) followed by 'hard' (> 14 hours) work shifts preserved firefighters' immune response after consecutive fireground shifts (Ruby et al., 2002b). Fire agencies should consider investigating the effects that flexible work scheduling has on the fatigue that Australian volunteer firefighters experience during consecutive days of bushfire suppression. Recovery between shifts may also be improved by firefighters engaging in low intensity activity (such as walking). Walking is a simple and practical way to reduce any fatigue from one shift to the next. Periods of 'active recovery' have been consistently shown to augment athletes' recovery from vigorous and / or prolonged sporting activities (Reilly & Ekblom, 2005). Whether active recovery produces a meaningful benefit for fatigued bushfire fighters is currently unknown.

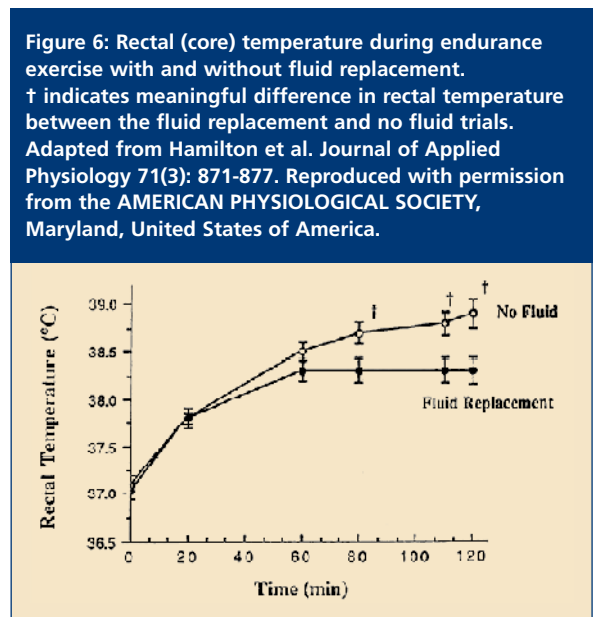


Figure 5: Differences in core work tasks for fire authority personnel (left) and land management crews (right).
 Reproduced with permission from Country Fire Authority, Victoria, Australia.

Hydration

The loss of body water (i.e., dehydration) is a classic source of fatigue (Sawka & Pandolf, 1990). Dehydration causes fatigue by exaggerating physiological strain, and impairing physical, and mental performance (Kay & Marino, 2000). Each of these factors can compromise the health and safety of the individual (Sawka & Pandolf, 1990). The fatigue experienced as a result of dehydration may be related to a rise in core temperature (Febbraio, 2003). Fluid loss reduces blood volume, which in turn reduces the volume of blood that can be sent to the skin surface to cool the body through sweat and evaporation (Coyle & Gonzalez-Alonso, 2001). When fluid is not replaced during an exercise session, core temperature rises steadily until exhaustion [Figure 6; (Hamilton et al., 1991)]. Modest increases in core temperature have been associated with muscle weakness and a loss of balance (Wilmore & Costill, 1994). These symptoms present a serious risk to the health and safety of Australian bushfire fighters who are performing repetitive manual handling tasks over an 8.5 – 12 hour shift. If core temperature continues to rise, the individual will stop sweating and lose consciousness (Wilmore & Costill, 1994). The reduction in blood volume without fluid replacement also causes heart rate to increase rapidly, as the heart must beat faster to deliver the same amount of blood (Hamilton et al., 1991). The accelerated heart rate associated with dehydration may be particularly harmful for older individuals or those with pre-existing heart conditions. Dehydration also impairs cognitive function (e.g. decision making) in proportion to the volume of fluid loss (Cian et al., 2000; Gopinathan et al., 1988) which may compromise the health, safety, and productivity of the individual and their fire crew. The negative effects of progressive dehydration during physical work may be amplified in the volunteer firefighter who may report to the fireground in a dehydrated state having already completed their normal employment before

turning out. Simple measures of hydration status such as urine colour could be used by firefighters before their shift to ensure they are well hydrated before turn out. Investigating the accuracy and acceptance of such measures will be valuable to Australia's fire agencies, as the hydration status of Australian tanker-based volunteer firefighters has not been directly assessed.



Research into the hydration status of Australian firefighters constructing fireline using handtools found these workers did not adequately replace their fluid loss even when under instruction to drink frequently (Hendrie et al., 1997). Whether this reflects the type of drink that was available or is a part of the firefighting culture is not clear. The type of drink (or combination of drinks) required to maintain firefighter's fluid levels remains to be determined. Exercise science literature advocates a carbohydrate and electrolyte (i.e., salt)

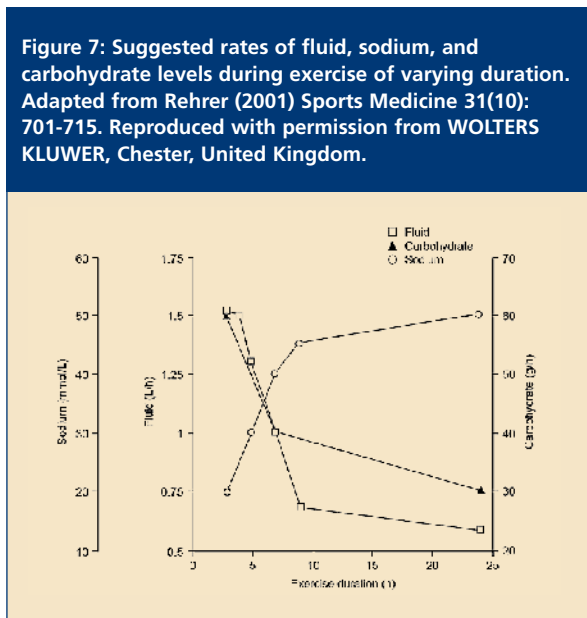
beverage is optimal for working in the heat (Rehrer, 2001). The carbohydrate provides energy, which is critical for sustaining work rate (von Duvillard et al., 2004) over the long working hours undertaken by bushfire fighters. During work in hot conditions, the body burns carbohydrates more quickly, reducing the sustainable energy supply (Febbraio, 2001). Provided the carbohydrate content is less than 10 per cent such as in many commercially available sports drinks, the fluid passes through the digestive system and reaches the muscles as fast as water (Convertino et al., 1996). The inclusion of electrolytes, particularly sodium, helps maintain the “drive” to continue drinking, minimizing urinary fluid losses post-shift, and therefore maintains body fluid volumes, more effectively than water (Rehrer, 2001). The increased fluid retention limits rises in core temperature (Hamilton et al., 1991), either creating a ‘heat sink’ in the gut (Kay & Marino 2000) or by sustaining sweat rates to continue evaporative cooling (Cheuvront et al., 2003). The concentrations of carbohydrate and electrolytes and the volume of fluid advised for exercise of different durations has been modeled in the broader exercise science literature (Figure 7). The exact make-up of a drink that firefighters are willing to drink frequently and will adequately maintain their fluid levels remains to be investigated. In the interim, firefighters should drink both commercially available electrolyte replacement drinks and water during their shift to stay hydrated.

Firefighters are likely to return from their shift highly dehydrated (Hendrie et al., 1997). Performing physical activity or work whilst dehydrated impairs cognitive functioning, reduces work output, and exaggerates physiological strain (Kay & Marino, 2000). Therefore, restoring fluid levels should be a fundamental part of firefighter’s post-shift behaviour. If fluid levels are not replenished, firefighters will turn out to the next shift dehydrated, increasing their risk of fatigue, heat stress, and compromise the health, safety, and wellbeing of themselves and their crew. Formal research into the optimal re-hydration strategy for Australian bushfire fighters during and after their shift should be a priority health and safety research area for Australia’s fire agencies.

Nutrition

Falling carbohydrate levels during exercise has been classically associated with fatigue (Coyle 1995). Without adequate carbohydrate stores, there is not enough energy to sustain their current work-rate (ACSM, 2000). Low carbohydrate stores have also been associated with reductions in decision making and mental awareness during physical work (Lieberman et al., 2002). The negative effects of falling energy levels during physical work may be amplified in the volunteer firefighter who may report to the fireground with low energy levels having already completed their normal employment before turning out. Firefighters should consume carbohydrate-rich foods with a slow release of energy (e.g., whole grain breads, pasta) before arriving at the staging area. Formal investigation into the energy levels of Australian volunteer firefighters is, however, required before fire agencies can develop practical pre-shift nutritional guidelines to preserve the wellbeing of their firefighters during bushfire suppression.

Research using USFS firefighters indicates that consuming small serves of carbohydrate-rich food regularly during a fireground shift increases productivity (Figure 8), especially late in the shift when the energy they obtained during the pre-shift or lunch meal has been already used up (Ruby et al., 2003). Regular consumption of carbohydrates during physical labour has also been shown to prolong alertness and delay the onset of lethargy and poor decision making (Lieberman et al., 2002). The frequency and type of carbohydrate (i.e., liquid, solid, or in combination) that Australian volunteer bushfire firefighters should consume to delay fatigue on the fireground should be a priority research area for Australia’s fire agencies. In the interim, firefighters should ensure they snack frequently on convenient, carbohydrate-rich foods such as muesli bars and fruit to sustain their energy levels throughout a shift.



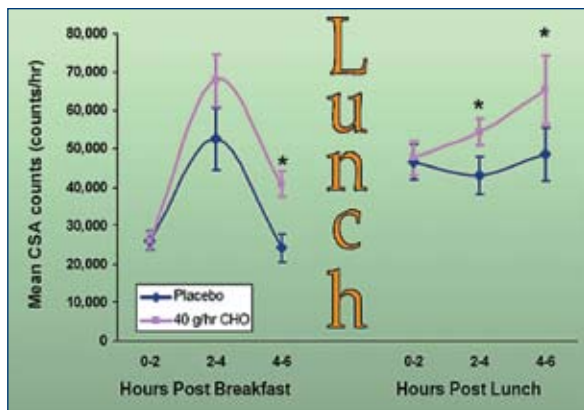


Figure 8: Work activity during work-shift with and without (placebo) intermittent carbohydrate feeding. Adapted from Ruby et al. *Wildfire Lessons Learned*, <http://www.wildfirelessons.net/Home.aspx> Retrieved February, 2006. Reproduced with permission from WILDFIRE LESSONS LEARNED CENTRE.

The restoration of firefighters' energy levels, primarily by eating carbohydrate-rich foods after their shift has been implicated in the preservation of immune function (Harger et al., 2004). Preliminary data from the USFS indicates that firefighters who maintain their carbohydrate levels show a lower incidence of upper respiratory tract infections (Harger et al., 2004). More research into the area of nutrition and immune function for firefighters and emergency service workers in general is required. Restoration of energy levels is vital for firefighters turning out for subsequent shifts where low energy levels will, most likely, be associated with the rapid onset of fatigue (ACSM, 2000), low productivity (Coyle, 1995), and poor decision making (Lieberman et al., 2002). Fire agencies need to continue working with nutrition experts to devise practical ways to deliver carbohydrate-rich foods to firefighters following their shift. Measuring the impact that post-shift nutrition has on the firefighter fatigue, especially during consecutive fireground shifts should be a fundamental part of the current and future nutrition practices employed by Australia's fire agencies.

Heat

Bushfires burn in hot, dry weather conditions (Cheney, 1976) and produce extreme radiant heat (Budd & Cheney, 1983). It is expected that Australian bushfire fighters face considerable thermal stress and risk heat-induced fatigue during their bushfires suppression duties (Black 1987). The only research into the heat loads imposed during bushfire suppression reports, however, that firefighter's physical labour actually exerts a greater heat stress than the fire and weather conditions combined (Budd et al., 1997b). The findings from Project Aquarius (Budd et al., 1997b) are directly applicable to land management agency fire crews during the preparation and containment of fuel-reduction burns. The relevance of their findings to fire crews working to suppress accidental summer

bushfires may be less straightforward. The research in Project Aquarius was conducted using experimental fires burning in warm temperatures (17-33°C), with only medium relative humidity (14-81%) and moderate wind speeds (7-32 km·hr⁻¹). Given that tanker-based bushfire suppression is usually carried out in hot (33-45°C), dry (relative humidity < 20%), and windy (25-72 km·hr⁻¹) environments it is likely that the heat load and, hence, fatigue will be greater at wildfires than in experimental fire conditions. The actual heat load experienced by Australian tanker-based firefighters during bushfire suppression is unknown. The heat stress arises not only from the hot environment but also from the personal protective clothing worn to protect the firefighter from radiant heat and burning debris. Thought fundamental for the firefighter's safety, personal protective clothing often restricts evaporation of sweat and dissipation of metabolic heat, increasing heat storage, cardiovascular strain, discomfort, and fatigue (Budd et al., 1997c). The contribution of the current firefighting ensemble to firefighter heat strain is unclear. To measure firefighter's heat strain during bushfire suppression, our laboratory has started using an easily digestible tablet to measure core temperature and adhesive skin temperature patches. These devices collect data during tanker-based bushfire suppression without disrupting the firefighter from their duty (Figure 9). This research may lead to strategies to help firefighters cope more effectively with the heat loads they face during their bushfire suppression shift, delaying the onset of fatigue.



Figure 9: Core temperature tablet (a), skin temperature patch (b), and portable data logger (c) for measuring heat strain during tanker-based bushfire suppression. Adapted from <http://www.minimitter.com/Products/VitalSense/index.html> Retrieved February, 2006. Reproduced with permission from, MINIMITTER INC., Oregon, United States of America.

Smoke

In the smoke filled environment of a bushfire, exposure to carbon monoxide and other smoke compounds may also lead to fatigue. For instance, carbon monoxide exposure can lead to headaches, dizziness, and confusion that increase with the level of exposure (Raub et al., 2000). Exposure to carbon monoxide

before or during exercise also reduces work output whilst increasing heart rate (Carlisle & Sharp, 2001), exaggerating physiological strain – all symptoms of fatigue. Other smoke compounds such as particulate matter and volatile organic compounds may also impair lung function, reducing the value of air that can be inhaled and exhaled (Carlisle & Sharp, 2001) potentially limiting firefighter's work productivity. For a comprehensive discussion on the interactions between the compounds commonly found in air pollution (including smoke) and work activity, the reader is referred to Carlisle and Sharp (2001).

Fitness

Cardiorespiratory endurance or 'aerobic fitness' is considered fundamental to countering firefighter fatigue (Sharkey, 1997). High levels of aerobic fitness enable individuals to continue or persist in strenuous whole-body work tasks for long periods of time (Nieman, 2003). Preliminary research from the USFS indicates that aerobic fitness was strongly associated with daily work output over a nine day period (Gaskill et al., 2002). Australian research into handtool fireline construction also suggests that superior aerobic fitness becomes especially important in emergency situations when firefighters cannot afford to pace themselves during their shift (Brotherhood et al., 1997b). The importance of aerobic fitness to safe and productive handtool fireline construction has led to the routine assessment of fire crews' aerobic fitness levels in USFS (Sharkey 1999) and Australian land management agencies (Ellis & Gilbert, 1997). The highest 'fit for duty' standard for land management agency fire crews is achieved by walking 4.8-km, wearing a 20-kg pack in less than 45 minutes (Sharkey, 1999). The pack-hike test has been deemed to simulate the physiological demands of hand tool suppression of bushfires (Sharkey, 1999). The expectation upon passing this test is that the individual has the necessary fitness to complete similar work tasks on the fireground (Payne et al., 2005). Whether the pack hike test accurately simulates the physiological demands of tanker-based suppression is yet to be determined. Differences in core work tasks (i.e., raking fireline versus spraying fire hoses) between land management and fire authority crews [Figure 5 (AFAC, 2002)] may limit the applicability of the pack hike test to tanker-based fire crews. The physiological attributes necessary for safe and effective tanker-based bushfire suppression have not been identified. Tanker-based crews move, carry, and hold equipment (including fire hoses), and patrol firelines repeatedly over an 8.5 to 12.0 hour period. Tanker-based work is not only likely to challenge firefighter's aerobic fitness, but also their muscular strength, and muscular endurance. Investigating whether aerobic fitness, muscular strength, and / or muscular endurance are important for safe and productive tanker-based bushfire suppression is fundamental to preserving the wellbeing of Australia's

rural firefighters. By identifying the fundamental fitness components for tanker-based bushfire suppression, fire agencies can advise their personnel on the physical activities they can undertake to prepare physically for the fire season, increasing their resistance to fireground fatigue. Research into the principal fitness components for safe and productive bushfire suppression is yet to be undertaken.

Experience

Skilled or experienced workers expend less energy during a set period of work (Sparrow & Newell, 1998). Experienced shearers, for instance, expended less energy whilst shearing the same amount of sheep as their inexperienced colleagues (Poole & Ross, 1983). Further, Salvendy and Pilitis (1974) demonstrated that, with practice, performance increased and energy expenditure decreased in a repetitive manual handling task. Experienced firefighters may also expend less energy during bushfire suppression than novice crewmembers, delaying the onset of fatigue. Whether more experienced firefighters are more efficient is yet to be determined as the effect of experience (or skill) on the firefighter's work or physiology during bushfire suppression has not been investigated.

Conclusion

Firefighter fatigue arises from a number of sources with considerable interplay between firefighters' behaviour, physical condition, and the fireground environment. The many symptoms of fatigue are a precursor to more serious health and safety risks for the individual and, potentially, their crew. Research into the many factors contributing to volunteer firefighter fatigue is underway. Specific areas of investigation include; sleep loss, work activity, hydration, nutrition, heat load, smoke, and fitness. An overview of these topics has been presented here for both individuals and agencies to consider. Understanding and managing fatigue on the fireground is, indeed, the responsibility of both the individual firefighters and the fire agencies as a whole to ensure that each crewmember returns from duty safely and in good health.

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REPORTS

Mainstreaming disaster risk management: a development issue for the Pacific Small Island Developing States



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In early 2005 the Cook Islands were struck by 5 cyclones in a single month.

Pacific islands at risk

The Small Island Developing States of the Pacific are located in one of the most threatened regions in the world, with the continuing presence of natural, human induced, technological and environmental hazards. Whilst the threats presented by these hazards may be seasonal or differ from country to country in respect to type, frequency or intensity, no country is immune to their devastating impacts.

The continuing increase in the occurrence of hazardous events in the Pacific coupled with population growth, poverty, urbanisation and inappropriate development activities are only compounding the situation and demanding new solutions. These solutions must effectively address the cause and effects of uncontrolled disasters. The mainstreaming of disaster risk management by island governments in support of an integrated hazard and risk management approach is considered essential to the development of appropriate national mitigation strategies.

The severity of natural hazards in the Pacific is increasing due to some extent to the effects of climate variability and extreme climatic events caused by global warming. Environmental degradation which is also a problem in the region often exacerbates the effects of natural hazards and can be the factor that transforms a climate extreme, such as a heavy downpour, into a disaster. Predicted sea level rise in the region and increased extreme climatic events will lead to a greater occurrence of coastal erosion, storm surges and damage to human settlements.

Levels of island vulnerability are related to the degree to which their socio-economic systems or environmental assets are either susceptible or resilient to the impact of these hazards. It is determined by a combination of factors including awareness of the hazards, condition of infrastructure, national policy and the quality of the disaster risk management arrangements and practices. The levels of vulnerability combined with the likelihood and potential consequences of an event that may arise determine their levels of risk.

The need for change

Recognising such vulnerabilities, the countries of the region have acknowledged the importance of taking an integrated, whole of government and whole of country approach to disaster risk management. This will necessitate the mainstreaming of disaster risk management into the national development process and include:

- Reducing disaster risks through improved adaptation and mitigation measures.
- Developing well-coordinated preparedness and response arrangements in the event of a hazardous event.
- Facilitating effective and timely disaster recovery and rehabilitation.

This broader commitment to mainstreaming disaster risk management is reflected in the recent endorsement by the Pacific Forum Leaders of the Pacific Regional Disaster Risk Reduction and Disaster Management Framework for Action, 2005-2015 and their support to the Pacific Islands Framework of Action on Climate Change, 2005-2015.

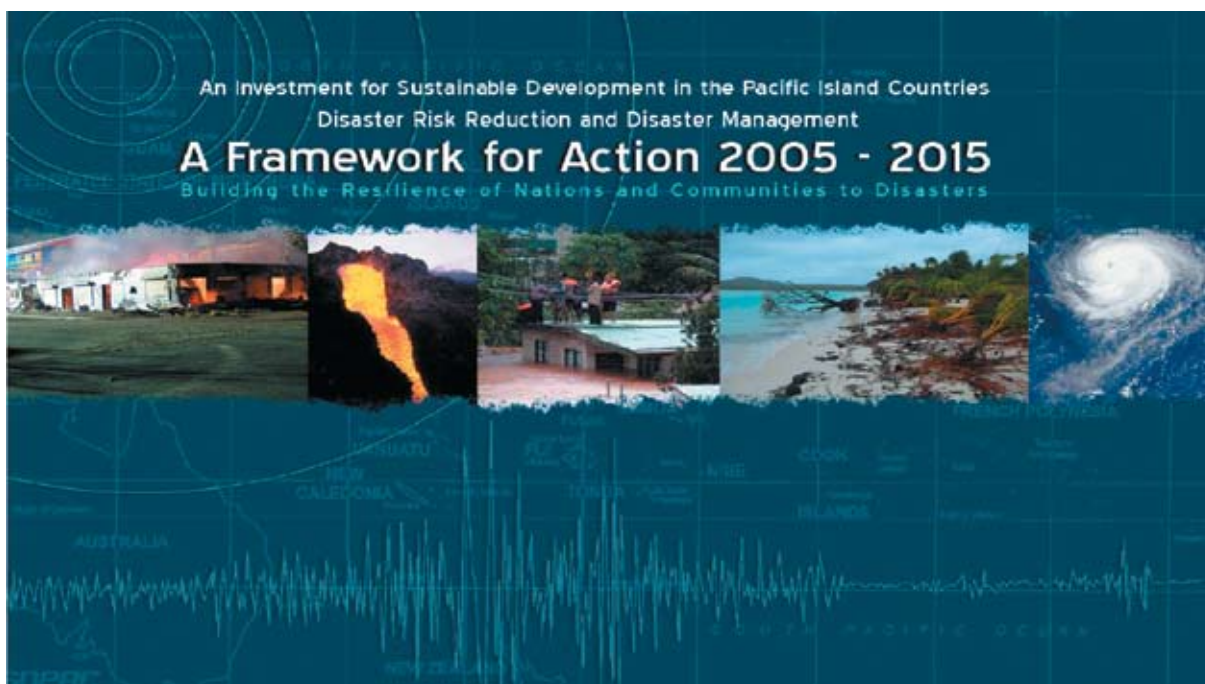
Both these regional frameworks outline key principles and strategies for disaster risk reduction and disaster management (including adaptation to climate change), emphasizing the importance of:

- Incorporating natural hazard risk management and adaptation to climate change into economic and social planning and budgetary processes (i.e. into the national sustainable development strategies or equivalent).

- Strengthening interdepartmental cooperation and public-private sector and public-community partnerships in disaster risk management.
- Strengthening risk management instruments such as regulations on climate proofing infrastructure, and financial insurance policies, and land use planning policies about where to establish growth centres, roads and other infrastructure.
- Adopting adaptation measures such as promoting the use of drought/salinity tolerant agricultural crops; encouraging the use of traditional methods of coping with natural disasters.

The Disaster Risk Reduction and Disaster Management Framework is essentially a Pacific version of the Global Hyogo Framework for Action which was agreed at the Second World Conference on Disaster Reduction held in Kobe, Japan in January 2006 and organises these principles and strategies under six thematic areas:

- Governance – Organisational, Institutional, Policy and Decision Making Frameworks.
- Knowledge, Information, Public Awareness and Education.
- Analysis and Evaluation of Hazards, Vulnerabilities and Elements at Risk.
- Planning for Effective Preparedness, Response and Recovery.
- Effective, Integrated and People-Focussed Early Warning Systems.
- Reduction of Underlying Risk Factors.



Regional frameworks such as these contain suggested activities to guide national governments and regional organisations in achieving expected outcomes by 2015.

Suggested national and regional activities are included in this document as a guide for national governments and regional organisations to achieve the expected outcomes by 2015.

In support of the mainstreaming of disaster risk management in Pacific Island countries the Pacific Forum Leaders, at their annual meeting held in Papua New Guinea in October 2005, called for the implementation of these regional frameworks at the country level, noting that resilience to natural disaster is a national issue and therefore disaster risk management must be strengthened at the national level.

Pacific Plan supporting disaster risk management

The Pacific Plan, which was also endorsed by the Forum Leaders in 2005, identified under its sustainable development and security core areas the implementation of Disaster Risk Reduction and Disaster Management (Pacific Plan Initiative 5.5).

Under Pacific Plan Initiative 5.1, the Pacific Island Nations are also tasked with the strengthening of national sustainable development strategies, which also include links between national planning and budgetary process and sectoral strategies, including disaster risk management.

The Heads meeting of the Council of Regional Organisations of the Pacific (CROP) in August 2005 agreed to coordinate their own efforts in assisting member countries and decided to adopt a joint programming approach where possible.

The challenge is in bringing these three strands together at the national level in relation to mainstreaming disaster risk management and in providing a coordinated and harmonised regional program of support to island

countries under the Pacific Plan in areas where they have limited technical capacity and where regional services add value to their national efforts.

World Bank encourages a greater effort in the region

The World Bank has recently called on the Pacific Leaders to focus on disaster risk management as a development issue rather than simply looking at it as an environmental or response issue. It is a cross cutting process that demands leadership and coordination at the highest levels of government with the key coordinating agency needing to be mandated to influence key sectoral ministries.

In its policy note, 'Not if but When', released in April 2006, the World Bank supports the Pacific regional frameworks and highlights three major constraints that have limited disaster risk reduction. These are:

- 'Perverse incentives', e.g., those which encourage national governments to do little to reduce risks because donors respond generously when disasters occur.
- 'Poor institutional arrangements', e.g., weak processes that inhibit the mainstreaming of disaster risk reduction into economic planning.
- 'Inadequate Instruments', e.g., lack of sufficient support for the development of key tools such as vulnerability mapping.

In essence, good governance at the national government level must therefore include the embracing of, and commitment to, an integrated approach to disaster risk reduction and disaster management practices and more importantly placing a high priority on regarding adaptation to climate change and disaster risk management as a development issue.



A major structure fire in the Marshall Islands in 2005 had a severe impact on the national economy.

Meeting the challenge

Disasters impose a huge burden on the small economies of island states already struggling to meet their basic needs and aspirations. It has been estimated that, for example, in the 1990s alone, the cost of natural disasters in the Pacific region was about \$US2.8 billion dollars (in 2004 dollars). These costs include direct loss of public infrastructure, including roads, schools, airports, etc, as well as private assets in terms of loss in homes, appliances, etc. There are other costs such as the cost of reduced economic activity and associated flow on effects.

No country is immune to natural disasters, although the frequency and types of natural disasters may vary considerably. Generally, Melanesian countries such as Papua New Guinea, Vanuatu and the Solomon Islands suffer the largest number of disaster events. Vanuatu, for example, reports economic losses on average during disasters of 30% of annual GDP, while in 2004 Cyclone Ivy resulted in an economic loss of at least '6 million vatu, affected some 25% 'of its ni-Vanuatu population – it also affected 90% of community water sources, 70% of road infrastructure and 60% of health infrastructure. This one event would have significantly put back the country's national development.

Polynesian countries such as Samoa and Tonga also experience high economic and social shocks during disaster years. According to World Bank statistics, on average, during disaster years, Samoa reports economic costs of 46% of annual GDP, while in Tonga such costs are reported at 14%.

Since the effects of disasters normally extend beyond the year of the event, a disaster also causes chronic shocks to national economies. The World Bank has estimated that on average, the countries incur an annual cost of 2-7 percent of GDP in both disaster and non-disaster years. Computer modelling of extreme weather

events for example, in the capital cities of Fiji, Solomon Islands, Vanuatu, Samoa and Tonga, predicts potential economic losses of up to 60 percent of GDP in the event of a 1 in 100 year cyclone.

The benefits of a mainstreaming approach

The Pacific island countries have historically demonstrated some resilience to natural hazards and an ability to rebuild their economies and societies with the use of traditional knowledge and external disaster relief and other development assistance. However, despite the best efforts of countries, regional organisations and international donors, during the past decade, the capacity of many island communities to effectively deal with the impacts of major disasters remains fragile. In some cases, particularly given the loss of traditional knowledge, it is almost non-existent while in others, despite whatever progress has been made; it remains tenuous in terms of its sustainability.

The risks posed by such hazards can only be effectively reduced and managed as an integral part of the national development process. This will involve the proactive management of disaster risks and reduction of vulnerability, expanding beyond the traditional approach to disaster preparedness, response and recovery.

Experiences from countries elsewhere in the world exposed to similar natural hazard risks suggest, amongst other things that:

- Efforts to prevent or minimize damage from natural hazards pay off in the long run
- Risk management efforts are more cost effective than waiting for the impact and then repairing the damage.



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The formation of the Pacific Disaster Risk Management Partnership Network. Founding members of the partnership meeting in Suva, Fiji 2006.

- Risk management efforts are most cost effective when introduced during the planning of investment
- Adopting a 'no regrets' policy, such as climate proofing investments can reduce vulnerability

Advocating for commitment by national governments

Since accepting the mandate from the Pacific Leaders to coordinate regional efforts in building safer and more resilient nations and communities to disasters the Pacific Applied Geoscience Commission (SOPAC) has embarked on an extensive high level advocacy programme to encourage national governments to adopt a more proactive approach to disaster risk management. The High Level Advocacy Team has been led by Dr Langi Kavaliku a former Deputy Prime Minister in Tonga and a highly respected eminent person in the region and has included Roger Jones, a former Director of the AEMI Mount Macedon. The team has held consultations with the heads of government and senior ministerial staff in Fiji, Cook Islands, Samoa, Tonga, Marshall Islands and Vanuatu. All of these countries have now indicated a commitment to embracing a disaster risk management approach to reducing underlying risks to national development.

Recognising that there are many international and regional development partners supporting member countries in their national development effort, including disaster risk management, SOPAC has also coordinated the formation of a *Pacific Disaster Risk Management Partnership Network*. The Network comprises over thirty regional and international organizations that have agreed the following key principles:

- Acknowledged that disaster risk reduction and disaster management are development issues within the broader context of sustainable human development and National Sustainable Development Strategies (NSDS).
- Recognised the critical role and efforts of national governments and that disaster risk reduction and disaster management programmes must be developed by and reflect the needs of all stakeholders in a whole-of-country approach.
- Recognised that a regional effort must be responsive to and support and complement national programmes and plans to strengthen resilience to disasters.
- Committed to coordinate their activities, work cooperatively and collaboratively under the framework of the Pacific Plan.

The main objectives of the partnership network are to:

- Provide regional support for the development and implementation of national action plans.

- Establish and sustain a network of regional assistance and development partners that work in the different fields of disaster risk reduction and disaster management to improve regional cooperation, coordination and collaboration.
- Strengthen the key thematic areas identified in the Pacific Framework for Action 2005 – 2015, as endorsed by the Pacific Leaders and in other associated frameworks and strategies.
- Monitor and evaluate national progress against the targets of these national action plans.
- Reduce duplication of effort and ensure that assistance is built on the efforts and experiences of each other.

At the first meeting of the partnership network held in Suva, Fiji in February 2006 it was agreed that the following priority areas of support would be the focus of the initial collaborative support by the partners.

1. To assist national governments to assess current capacities and needs for disaster risk reduction and develop and implement national action plans that could be supported by the partners through joint programming and implementation where possible. Vanuatu and Marshall Islands were chosen for the initial support in 2006 on the basis of, amongst other things, the demonstrated level of political commitment and their preparedness to adopt a whole of country and programmatic approach to mainstreaming disaster risk management at all levels of decision-making.
2. To support member countries in making evidence based decisions through the development of a regional information database. This is expected to provide a comprehensive overview, information and data on relevant legislation, regulations, policy, past experiences, risks, hazards and economic costs, maps, best practices and actors in Pacific Island countries for planning and decision-making in all aspects of natural disaster management (encompassing disaster risk reduction (prevention and mitigation) and disaster management (preparedness, response and recovery). It furthermore is expected to provide baseline information for national action plans and mainstreaming of the regional framework.

Vanuatu produces the first National Action Plan (NAP)

The regional partnership team recently facilitated a workshop in Vanuatu in partnership with the government agencies with responsibility for some aspect of disaster risk management and the National Women's Council to assess local risk management capacity and identify a way forward.

Following the workshop a Vanuatu taskforce was formed and with the assistance of the regional partners a draft national action plan on disaster risk management for Vanuatu, was developed and then endorsed by the Vanuatu Reference Group on Disaster Risk Management for public consultation; the Vanuatu Reference group on Disaster Risk Management comprises of the Director Generals of each Ministry.

At the request of the Prime Minister and as part of the consultation process the country's national development 'planning document, the Priorities and Action Agenda (PAA) 2005 - 2016, was also strengthened to mainstream disaster risk management into national development agenda.

A similar activity is planned for the Marshall Islands and it is anticipated that this process will be repeated for other member countries during 2007 and 2008 in order to help mainstream disaster risk management into their national development process.

The contribution of Australia and New Zealand partner agencies

The Australasian Fire Authorities Council (AFAC), Emergency Management Australia (EMA) and the New Zealand Ministry of Civil Defence and Emergency Management (NZMCDDEM) have been working closely with SOPAC for a number of years and have made a significant contribution to strengthening community safety through a range of institutional and technical support to fire protection and emergency management arrangements and capacity building. Through this partnership arrangement a number of Australian and New Zealand professionals have had the opportunity to work in the Pacific islands bringing with them their expertise and experience to assist those less fortunate than themselves.

Conclusions

Despite the best efforts of countries, regional organisations and international donors during the past decade the capacity of many Pacific island countries to effectively deal with the impacts of major disasters remains fragile. In some cases it is almost non-existent whilst in others, despite whatever progress has been made, it remains tenuous in terms of its sustainability. Clearly the reduction of community vulnerability can only be achieved through a more consolidated and integrated approach. This approach must target the improvement of current disaster management practices whilst at the same time addressing the underlying problem of understanding the cause and effects of the hazards themselves.

Whilst not all risks to development result from the impact of disasters, community resilience and risk reduction need to be central to any programmes designed to achieve and maintain sustainable development. By working together as strategic partners we really can make a difference to the lives and well-being of our Pacific neighbours.

Further information on the work of the SOPAC Community Risk Programme and on the progress of mainstreaming disaster risk management in Pacific island countries can be found on the SOPAC web site www.sopac.org

The SOPAC approach to the management of community risks is based on the fact that risk itself involves two elements – 'sources of risk' (hazards) and 'elements at risk' (vulnerable communities, economies infrastructure and environment). Our competitive advantage lies in the key areas of scientific research and analysis of hazards (sources of risk), understanding of community and environmental vulnerability (elements at risk) and through existing expertise in regional coordination, disaster management and capacity building.

In determining the priorities for the programme SOPAC has taken into account the current needs of member countries, the obvious lack of available resources and the need to address the broader global and regional priorities as articulated by the United Nations International Strategy for Disaster Reduction and the recent World Summit on Sustainable Development.

About the Author

Alan Mearns spent 33 years with the Metropolitan Fire brigade in Melbourne before taking up a position with the Pacific Applied Geoscience Commission (SOPAC) in May 2000.

During his initial 3 years at SOPAC he managed an Australian and New Zealand funded disaster management project, which was designed to institutionalise disaster management regional arrangements within SOPAC. In 2003 the project became an ongoing community risk programme, which is now providing a range of disaster risk management capacity building support to 15 countries in the Pacific region.

In December 2006 Alan returned to live in Melbourne where he now operates as a part time disaster risk management technical advisor and consultant to SOPAC.

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AJEM BOOK REVIEW

How Australia deals with disasters

In Case of Emergency

How Australia deals with disasters and the people who confront the unexpected

ISBN 978-0-9775866-1-5

Reviewer: Alastair Wilson

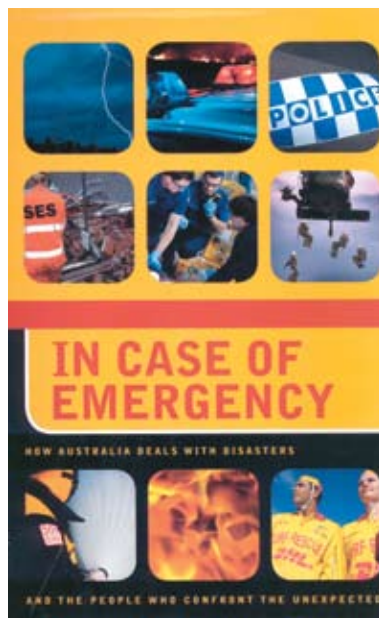
ETN-COM Publishing, Sydney.

This 220-page full-colour publication is an unprecedented visual and story presentation of Australia's emergency management and disaster recovery organisations in action. It's the first time such a comprehensive perspective of the sector has been produced.

In Case of Emergency is a high quality coffee-table style publication that presents a rich variety of history, method, organisational structure and operational incidents. It has been compiled by more than 40 contributors, many of them leading authorities in their fields, with Emergency Management Australia (EMA) being the project leader and major sponsor.

The aim of the publisher – ETN-COM Publishing of Sydney – in collaboration with EMA, is to provide articles and photographs that will create a deeper understanding and appreciation of the planning, efficiency and sheer courage that defines emergency management and emergency services in Australia.

The Director General of EMA, Tony Pearce, contributes two keynote articles: Prepare Now for the Stormy Times Ahead, and Keeping Everyone in the Loop. In his Foreword to the publication, Tony Pearce says it is a unique chronicle of Australia's skills



and achievements, its technology advances and developments and it provides a glimpse into the future for this important community sector.

Arguably, too little is known about the organisations that are responsible for our safety. This is the view of Australia's Attorney-General, the Hon Philip Ruddock MP. In his adjacent Foreword he says this is predominantly because most of their work is done behind the scenes. He adds that *In Case of Emergency* brings into focus the cooperation that exists, and the efforts of our local heroes.

Because volunteering is a mainstay of support in so many response agencies across the country, several case studies focus on the significant contribution and commitment made by our volunteers. The stalwart chairman of the Australian Emergency Management Volunteers Forum, Major General Hori Howard contributes a vivid picture of the value of the volunteer effort.

If it is the history of emergency response and management in Australia that interests you, then the substantial article contributed by former EMA Mt Macedon Training Institute Director Roger Jones, who was with EMA from shortly after it was formed as the Natural Disasters Organisation in 1974, will give you the pivotal events that changed the way Australia responds to its crises.

The other major government contributors to the book are the Australian Government Departments of Transport and Regional Services along with Health and Ageing, the Australian Federal Police, the Office of the Emergency Services Commissioner Victoria, the Queensland Department of Emergency Services, and the Metropolitan Fire Brigade and Metropolitan Ambulance Service in Melbourne. There are a number of private contributions on such topics as transport, telecommunications, technology, education, health and the special sciences. And the non-government sector is represented by the likes of Red Cross and the Salvation Army.

There are some 80 articles, vividly illustrated with action photographs sourced from across the spectrum of emergency services agencies.

In the words of Tony Pearce; those in emergency management and emergency services may be ordinary Australians, but as this publication demonstrates, their efforts and contribution are anything but ordinary.

**Commercial inquiries to
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Implementing New Zealand's Civil Defence Legislation

"New Zealand needs a modern and focused approach to managing emergencies.

This Act provides the basis for that approach."

Hon. George Hawkins, Minister of Civil Defence, January 2003.

Abstract

New Zealand updated its civil defence legislation in late 2002. As the five year anniversary of the new Act approaches, Fred Wilson examines how well the new statute has been implemented by central and local government, and the ramification on civil defence in New Zealand.

Introduction

Updated legislation, the Civil Defence Emergency Management Act (the CDEM Act), became effective in New Zealand in December 2002. The major consequences of the new legislation in planning terms were:

For central government:

- The completion of a national CDEM strategy by December 2003
- The completion of a national CDEM plan by December 2005
- The issue of written guidelines on the content of CDEM Group plans by December 2003

For local government

- The formation of regional CDEM groups by June 2003
- The completion of regional CDEM Group plans by June 2005 (or two years after establishment of the Group, whichever was earlier)

As we approach five years after the commencement of the new legislation, this paper takes a subjective look at the process of implementing the Act and the performance of the main players. For convenience and brevity, civil defence emergency management is contracted as CDEM except where it is quoted as a reference.

Central Government actions

National CDEM Strategy

Section 31 of the Act requires that a national strategy be developed that may include statements of:

- (a) the Crown's goals for civil defence emergency management,
- (b) the objectives to be pursued to achieve those goals, and,
- (c) the measurable targets to be met to achieve those objectives.

The strategy was duly developed and a draft issued for consultation. It was criticised widely for having targets that were not measurable. Local Government New Zealand for example said, *"Before adoption we would like to see the "achievement indicators" amended to more clearly reflect measurable targets: in particular, who, what, when, and how each of the actions objectives, and goals will be achieved and exactly how these will be measured."* (Hutchings, 2003, p1)

The Ministry did not heed the criticism and inconclusive targets remained in the document finally issued in March 2004, arguably in defiance of the legislative requirements of (c) above. Not a single target had defined criteria, or any specificity around quantity or quality. Two examples that demonstrate the unquantifiable nature of the language are:

- Goal 1, Objective C, Target 1 – *"Greater community input and participation in local government decisions regarding hazard risk management, such as land use planning."* (MCDEM, 2004, p15)
- Goal 2, Objective D, Target 1 – *"Greater co-operation and co-ordination between central government agencies regarding CDEM."* (MCDEM, 2004, p19)

While these may be appropriate and laudable targets, qualifiers such as 'greater' have no measurable preciseness and there are no time-related criteria.



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The strategy has a maximum life of ten years, but the Ministry asserted in the document that it would be “reviewed in 2006 with the intent of adding more action items and further developing measurable targets.” (MCDEM, 2004, p12). This review did not take place, but the Ministry asserts it has now commenced.

National CDEM Plan

Work commenced on developing a national plan shortly after the legislation was enacted in 2002. The Ministry established a working group comprised of practitioners from central government agencies and local government emergency managers to provide input. Detailed development of the structure of the plan followed over the next two years.

The Act requires that the national plan must state and provide for:

- (a) the hazards and risks to be managed at the national level;
- (b) the civil defence emergency management necessary at the national level to manage the hazards and risks described under paragraph (a);
- (c) the objectives of the plan and the relationship of each objective to the national civil defence emergency management strategy;
- (d) the co-ordination of civil defence emergency management during a state of national emergency;
- (e) the period for which the plan remains in force. (CDEM Act 2002, s.39 (2))

No-one had however understood the import of subsection (4) of Section 39 of the Act which said that a national plan was “a regulation for the purposes of the Acts and Regulations Publication Act 1989.” (CDEM Act, p28). When this factor was finally appreciated, just a few weeks before the new plan was to be presented to Parliament, thousands of hours of work and hundreds of pages of drafting were flushed away. The requirements of a regulation necessitate an archaic formality and severe restrictions on content, such as no diagrams, figures, tables or other graphics. A completely different document to that which had been worked on for two years was required.

In great haste the Ministry produced a new document to meet the requirements of a formal regulation and

issued it for consultation. Not surprisingly, as a result of the haste it contained a large number of inconsistencies, incorrect language and irregularities in terminology. Submissions tended to focus on these aspects with a working group member noting that “All of the Groups seem to be submitting on the same things (terminology, inconsistencies etc). (Private correspondence, 2005). One CDEM Group took a very strong approach to the Ministry’s situation and sought an amendment to the legislation to postpone the date a national plan was required. This would have been very embarrassing for the Government and the Ministry. A Ministry official noted that, in reference to the Group concerned, “that they are going to make it as hard as possible as ‘pay back’ for criticising their Plan - very adult.” (Personal correspondence, 2005). In the event, the National CDEM Plan Order 2005 was made by Order in Council on 14 November 2005 with an effective date of 1 July 2006.

As a consequence of being a regulation, the National CDEM Plan cannot be easily amended to keep it relevant and up to date. However, the Minister, the Hon. Rick Barker, has stated “The Director of MCDEM indicated that rather than wait five years for a review, a two-year review of the plan will be held.” (Barker, 2006, p6). The Director referred to was John Norton, who has since resigned and been replaced by John Hamilton, and it remains to be seen whether pragmatism will overtake that statement and this review meet the same fate as the promised review of the national strategy. The Ministry asserts that a review has commenced.

The national plan, like the strategy, also has some scant regard for the specifics of the legislation. Two examples are:

- The Act requires that the national plan must state and provide for the hazards and risks to be managed at the national level. Part 3 of the National Plan purports to address this requirement, but only goes into generalities and does not specifically state any hazards or risks at all.
- The Act, and the Ministry, professes a holistic approach to emergency management across the 4Rs – reduction, readiness, response and recovery. However the national plan addresses only the latter three, and is bereft of any mention of the national approach to reduction or mitigation of risks and hazards. This is despite the National Strategy expounding that the

“focus on risk reduction is a key difference from the old civil defence arrangements”. (MCDEM, 2004, p10). It is also pertinent that the Act requires that the National Plan must not be inconsistent with the National Strategy, and this omission is thus a glaring lack of consistency and compliance with its own statute.

Guidelines

To overcome the belated recognition by the Ministry that the format of the national plan would be compromised by the requirements of it being a formal regulation, the decision was taken to produce a Guide to the National Plan. In effect, this would be the mechanism by which material that was prevented from being in a regulation could be published with some authority by being associated with the plan. It is not a statutory document however and there is some doubt as to its real enforceability.

The Director of CDEM issued guidelines on how CDEM Groups should develop their regionally-based plans. These were throat-clearing documents that made multiple suggestions on approaches that could be considered. Consequently, they did not fulfil the purpose of being guidelines, as they provided no definitive leadership or advocacy to achieve consistency between the various Group plans.

Several other guideline documents were produced of varying quality and utility, but all generally suffered from an equivocating approach. As a defining moment in policy development, the opportunity existed with the new legislation for the Ministry to show strong leadership. There was a chance to promote consistency and constancy across the CDEM spectrum by strong advocacy for common principles and practices. This opportunity was not taken.

The Act gives the Director the power to issue guidelines, codes or technical standards. The nature of a guideline is that it can be no more than advice on best practice. No codes or standards have been produced yet. It would seem preferable for the Ministry to transition to issuing codes and standards that direct consistency, rather than vacillating guidelines that promote alternative approaches.

Local Government

CDEM Groups

Regionally focussed CDEM committees were a requirement under the old legislation. They were often moribund entities however, and because they were commanded by regional councils they were often mistrusted by city and district councils. Almost universally, local government approached the requirement for a new arrangement enthusiastically. This can be attributed largely to the new Act nominating the chairperson or Mayor of the local authorities as the member of the regional oversight committee, and the

chief executive of the local authority as the member of the supporting officials committee. The Act allowed nominees as replacement members, but generally only the more populous centres took advantage of this dispensation. This seems to reflect the self-importance of the Mayors and Chief Executives of the larger cities who are more concerned with monuments to their tenure than the mundane reality of preparing for an emergency. The observation is that the strongest CDEM Groups are those in the smaller rural-centric areas where senior management has accepted the responsibility for CDEM personally. This difference is also manifest in the commitment to business continuity for council operations. As a generalisation, it receives only lip service in large councils where the chief executive takes little or no part in CDEM activities, and even less interest.

CDEM Group Plans

Regional plans were produced by all sixteen of the newly formed Groups in accordance with the legislation. Some Groups produced their documents earlier than others, which allowed the late-beginners an element of plagiarism. That is not a criticism, and in fact should have been encouraged in the interests of national consistency.

While each region is obviously different geographically and each has to lay more emphasis on some hazards than others, that is no rationale for having different procedures, terminology and response structures to their neighbours. In a country of 4 million people, most of whom are quite mobile, being subject to different emergency management terminology and arrangements every few hundred kilometres is clearly nonsense. While there is a benefit in each region taking ownership of their particular risks and hazards, the variability of those elements between regions is essentially a question of degree, not of difference.

Had more thought gone into the process of plan development, and more leadership been shown by the Ministry, the plans could have been very similar and consistent. As it is, the published plans vary from the 69 pages of the Manawatu-Wanganui plan to those of Canterbury and Otago at 488 and 446 pages respectively. Such divergence in completing a common task cannot be easily explained away.

That said, many of the plans are compelling documents in their own right. Many unfortunately also make promises about future work that has not been delivered upon. For example, the Auckland plan (CDEM Group Plan for the Auckland Region, 2005) contains a detailed list of targets and actions. As of April 2007, 3 of the 4 high priority plans or procedures scheduled to be completed by June 2006 had not been done and the process of drafting has not even been started. No action has been taken either on any of the six medium priority plans or procedures scheduled to be completed by June 2007.

A subjective Report Card

As the opening quote shows, the new legislation was to herald a modern and focused future for civil defence in New Zealand, according to the Minister at the time. There is no doubt that improvements have been made – but is it enough to deal with ‘the big one’? Perhaps the safest answer is the one given by Chou En-Lai to the question of whether the 1789 French Revolution benefited humanity, which reportedly was, “It’s too early to tell”.

All the main players have met the legislative timetable set by the Act. All the indications are however, that there are still broad inconsistencies in the documentation developed, and aspirations are not being met. Promised reviews have not occurred, plans and procedures have not been written as forecast, and there is still an alarming lack of national uniformity. This is particularly evident in the continuing lack of a modern, nationally-integrated, information support system; and even more amazingly, the lack of a single mandatory format for something as simple as a Sitrep.

That is not to say that individuals in central and local government have been indolent. Many have worked tirelessly to make a difference. What has been lacking is some good old fashioned leadership. The power to unify and coalesce effort with a compelling vision and a realistic approach. The setting of clear, manageable and measurable targets that focus effort in a single direction. The willingness to set, promote and maintain standards that improve co-ordination, collaboration and consistency.

The Ministry was given the opportunity to comment on the draft of this article and their response has been taken into account in the final version. They noted that they *“believe we in MCDEM and the sector more generally, have turned the corner and the attitudes and problems that dogged development in the period up to 2005, are behind us”* (MCDEM comment, 2007)

The Ministry has recently had a new Director appointed, a large increase in staff numbers, and a greater budget. Perhaps the modern and focused future for CDEM in New Zealand is about to start. For the time being, the report card chillingly reads “Little improvement noted. Can do better.”

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About the author

Fred Wilson, after a career in the Royal New Zealand Navy, was the Emergency Manager for Auckland City Council for five years and was also appointed as the first Group Controller for the Auckland Region CDEM Group. He retired in 2005 and now provides consultancy services in the risk and emergency management fields.

Diversity in Emergency Services Conference

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- To promote diversity as the responsibility of all departments within emergency services organisations
- To explore and showcase the business case for diversity within the emergency services sector
- To learn about the challenges faced by emergency services in developing diversity competence and engaging with diverse groups in the community
- To explore and consider the various diversity strategies developed by, and/or recommended to emergency services

Conference Themes

1. Building the Diversity Business Case
2. Building Capacity of the Emergency Service
3. Recruitment and Retention
4. Community Engagement/Partnership
5. Benchmarking and Measuring Progress

Who should attend?

- Senior leaders in Emergency Management roles
- Union leaders within the emergency services sector
- Emergency services personnel
- Academics in the field of emergency management, anthropology, ethnic studies, Indigenous studies, gender studies, disability studies, diversity management
- Public administrators and policy makers
- Private and public sector leaders
- Workplace trainers, HR and organizational development practitioners
- Diversity practitioners
- Multicultural, disability, indigenous and women's groups and organisations
- Federal, State and Local Government managers and policy makers
- Research students

International speakers:

Captain Brenda Berkman

First female firefighter appointed to New York Fire Department

Dr Dave Baigent

Director Fire Service Research and Training Unit in the United Kingdom.

Captain Louie Wright

Chairperson of the International Association of Firefighters Human Relations Committee in the United States

Convenors:

The Metropolitan Fire and Emergency Services Board and the United Firefighters Union of Australia

Conference program inquiries:

Dalal Smiley,
Manager Equity and Diversity, MFB.
Tel: (03) 9665 4415
Email: dsmiley@mfb.vic.gov.au

Sponsors: Emergency Management Australia, Office of the Emergency Services Commissioner and Mingara Services.

EMA Update

Emergency Management Australia provides national leadership in the development of measures to reduce risk to communities and manage the consequences of disasters. EMA Update keeps AJEM readers abreast of the activities that assist this aim.

PUBLIC SAFETY TRAINING PACKAGE REVIEW

The review of the emergency management competency standards of the Public Safety Training Package (PSTP) has now commenced. Emergency Management Australia (EMA) will coordinate the review as a project on behalf of the sector.

The project exists because of a major review of the PSTP being undertaken by Government Skills Australia (GSA). It is important for the emergency management sector to develop accurate competency standards that may assist with workforce planning, recruitment and performance management processes within the industry as well as providing outcome statements for the development of learning and assessment strategies.

The aim of the project is to produce a key issues paper, communication strategy and consultation plan for the emergency management sector that will contribute to the broader review of the PSTP.

The Phase II review, the development and validation phase, follows the completion of a first phase that analysed the endorsed components

against current and anticipated needs across all public safety industry sectors. Identification and initial recommendations for improvement have been proposed through comprehensive consultation, research and analysis that have been approved by the industry.

The communication strategy includes fortnightly updates that provide stakeholders with regular communication of the progress of the review and how they may contribute to the process. For more information including registering to receive the updates, please contact the Project Manager or visit the EMA website and follow the links.

Andy Smith has been seconded to EMA from the Office of the Emergency Services Commissioner (Victoria) as Project Manager – Training Package Review.

Andy's contact details at EMA are:

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Email: andrew.smith@ema.gov.au

AJEM SURVEY – APOLOGIES TO OUR READERS

Included in the May issue of AJEM was a readership survey however due to a technical hitch the Reply Paid envelope which should have accompanied your AJEM was not included. We apologise for this oversight.

To ensure all readers have the opportunity to respond, another copy of the survey is included with this issue along with the missing envelope. The closing date for the survey has been extended to 19 October 2007.

Many thanks to those who have already responded either in print or electronically as we have recorded your comments and it is not necessary for you to respond again. If you haven't yet had the chance to complete our survey, here is another opportunity.

Thank you for your time.

ATTORNEY-GENERAL ANNOUNCES SUCCESSFUL GRANT RECIPIENTS UNDER THE WORKING TOGETHER TO MANAGE EMERGENCIES INITIATIVE

On 18 July 2007 the Attorney-General, The Hon Philip Ruddock MP, announced details of 423 projects, valued at well over \$13.8 million to be funded in 2007/08 through the Local Grants Scheme (LGS) and National Emergency Volunteer Support Fund (NEVSF).

The two programs were developed in September 2004 as part of the Working Together to Manage Emergencies initiative which recognised the need to develop self-reliance at both the community and local government levels. The initiative provides funding to support local governments, communities and volunteer organisations to develop strategies to improve community safety and to improve recruitment, retention and training for volunteers involved in emergency management.

Successful projects for 2007/08 ranged in value from \$1,195 to outfit a Bush Fire Brigade training room to \$273,260 for the development of State and Region Emergency Risk Assessment Guidelines by the cross-jurisdictional National Risk Assessment Advisory Group.

Each state and territory convened Selection Committees to prioritise all applications for funding received from local government areas, indigenous communities and volunteer agencies within the jurisdiction. This ensured that only those projects that were consistent with the emergency management priorities of the state or territory were successful.

The projects supported in 2007/08 provide a balance across rural and urban areas, and offer assistance to remote communities, indigenous communities and capital cities taking account of

the risks and vulnerabilities facing people living in those communities. The successful projects provide assistance to the full range of volunteer organisations active in the emergency management sector and support their endeavours to build safer sustainable communities.

The funding allocated to local governments and volunteer emergency management agencies will assist them to further develop their capability to undertake their responsibilities. The funding breakdown by individual jurisdictions as announced by Mr Ruddock was:

Jurisdiction	Total
NSW	\$3.2 million
Victoria	\$2.4 million
Queensland	\$3.0 million
SA	\$1.5 million
WA	\$1.9 million
Tasmania	\$0.7 million
NT	\$0.5 million
ACT	\$0.2 million
National Projects	\$0.4 million.

National projects are those assessed as having significant benefit across all states and territories.

2007/08 is the final year of funding through the Working Together to Manage Emergencies initiative. The Australian Government is currently considering options for possible replacement programs and any such programs will be promoted widely after a decision is made.

EMA'S INCLUSIVE EMERGENCY MANAGEMENT WITH CULTURALLY AND LINGUISTICALLY DIVERSE COMMUNITIES PROGRAM

Part of the National Action Plan (NAP) to build social cohesion, harmony and security, the four-year program entitled EMA's Inclusive Emergency Management with Culturally and Linguistically Diverse Communities (CALD) Program is progressing towards its outcomes.

Since the last edition of this Journal the Program personnel undertook the following activities:

- A culturally specific national school education emergency management resource for youth, in particular years 8 -10, was drafted and piloted in a range of secondary schools.
- Jurisdictional working parties were established for three-year community-based action learning projects. Each participating jurisdiction developed a project plan and commenced implementation.

- Planning for workshops on recruitment and retention of CALD volunteers in emergency management commenced.

The revised Guidelines for Working with Culturally and Linguistically Diverse Communities in Emergency Management was completed and published. The guidelines will be available on the EMA website as well as in hardcopy format following a launch of the guidelines that is planned for early November.

If you would like more information on the EMA's Inclusive Emergency Management with Culturally Diverse Communities (CALD) Program, please contact **Judy Parker** at EMA by:

Tel: 03 5421 5229

Email: judy.parker@ema.gov.au

MARGERY WEBSTER



Margery Webster has announced her resignation from EMA effective as at 31st August 2007. Margery has worked at EMA since 27th August 2001, when she commenced as Assistant Director, Educational Development, and she has been Director of Education and Training since 20th January 2005.

Margery has been a driver of many changes at the EMA Institute and the way it does business. Some of her most significant work has been: the development of EMA courses to align with nationally recognised competency standards; the introduction of the Advanced Diploma (Public Safety – Emergency Management) and Graduate Certificate (Emergency Management), and the development and implementation of the EMA Strategic Directions Paper.

Coming to EMA with high level, and relevant educational experience and excellent networks she has been a leader in the wider emergency management education and training field. She has been instrumental in the maintenance, review and enhancement of the Public Safety Competency Standards, in particular for the emergency management sector. Especially significant was her stewardship of the project that developed competency standards for recovery management through a rigorous and inclusive consultative process.

Her role was a watershed for the emergency management industry in facilitating the introduction of learning and assessment strategies to create formal career pathways for personnel in the Industry.

Margery was the emergency management representative on the working group, and then the Board, of the Public Safety Industry Training Advisory Board (PSITAB) and has more recently been the public safety representative on the Board of the Industry Skills Council Government Skills Australia (GSA).

AUSTRALIAN EMERGENCY MANUALS

The Australian Emergency Manuals series comprises a Principles and Reference and Skills for Emergency Service Personnel set. For ease of access, the manuals are listed below in alphabetical order by title. You can read these electronically on the EMA website (<http://www.ema.gov.au>), or can request print copies via our print-on-demand service which can also be accessed on the EMA website.

AUSTRALIAN EMERGENCY MANUALS SERIES STRUCTURE AND CONTENT PRINCIPLES AND REFERENCE

Australian Emergency Management Arrangements	Manual 2	Flood Warning	Manual 21
Australian Emergency Management Glossary	Manual 3	Guidelines for Psychological Services: Emergency Managers Guide	Manual 25
Australian Emergency Management Terms Thesaurus	Manual 4	Guidelines for Psychological Services: Mental Health Practitioners Guide	Manual 26
Community and Personal Support Services	Manual 18	Health Aspects of Chemical, Biological and Radiological Hazards	Manual 13
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Emergency Management Planning for Floods Affected by Dams	Manual 23	Recovery	Manual 10
Emergency Planning	Manual 43	Reducing the Community Impact of Landslides	Manual 24
Emergency Risk Management – Applications Guide	Manual 5	Safe and Healthy Mass Gatherings – under review	Manual 12
Evacuation Planning	Manual 11	Small Group Training Management Manual	Manual 41
Flood Preparedness	Manual 20	Urban Search and Rescue: Capability Guidelines for Structural Collapse	Manual 16

Flood Response	Manual 22		
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Communications	Manual 38	Leadership	Manual 32
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USEFUL INFORMATION

Australian Journal of Emergency Management

The Journal is published quarterly and is disseminated throughout the emergency management community and related disciplines, in Australia and overseas. Articles identifying and discussing issues, policies, planning or procedural concerns, research reports and any other information relevant to the emergency/disaster management community are welcome.

Refer to the EMA website (www.ema.gov.au/ajem) for current and past issues and information on how to subscribe and contribute.

Letters to the Editor

The Journal welcomes Letters to the Editor. Please note that letters should be no more than 300 words. Letters exceeding this limit may be edited or refused. Letters must be in good taste and focus on issues of emergency management or past AJEM content.

Letters must contain a name, address and daytime phone number of the author. Unsigned letters or those submitted without a phone number will not be considered.

Regular contributors should submit letters on varied subjects. Letters by the same author that reiterate opinions previously expressed may not be published. The editor reserves the right to reject or edit any Letter to the Editor.

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Conference Diary

Full details of local and international conferences relating to emergency management are available from the EMA website. For information, please visit www.ema.gov.au.