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TANZANIA

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Editorial

When terrorists flew fuel laden aircraft into the World Trade Centre in New York and the Pentagon in Washington DC on 11 September 2001, causing massive destruction and loss of life, they changed the lives of most of us forever. The subsequent bio-terrorism attacks in the United States and Australia have done nothing to ease this situation. In Australia, around 2,500 'white powder' incidents have occurred with no traces of biological agent being identified. These senseless acts placed a great demand on our emergency services which responded well, managing incidents in a most professional way. However, the events have added a new dimension to the roles of the emergency services and the public health system.

Before 11 September 2001, everyday Australians did not think of terrorism as something that could affect them. Even though the recent terrorist attack occurred in the United States, strong association with the United States, the Anthrax scares, and threats of retaliation for Australian involvement in Afghanistan have made terrorism seem a real threat. The topic of terrorism has been placed firmly on the Australian public agenda.

The result is that we are now living in an increased security environment which seems destined to remain for some time. We are going to have to get used to greater security everywhere we go, both in Australia and internationally. Recent events have shown that dealing with terrorism is not just a matter for law enforcement agencies and the military. It is the business of all emergency services, supported by the public health system.

The range and scale of emergencies that emergency services are going to have to deal with has changed. Terrorism offers greater likelihood of multiple simultaneous events. This, like a very large single event, will challenge existing emergency management resources. In the past, we associated terrorism with the use of

bombs or other sophisticated devices. Concern has now turned to chemical, biological and radiological hazards, and we are reminded that very simple weapons can be used to hijack planes, trains, etc. and turn them into weapons of mass destruction.

Dealing with the consequences of such an event will fall squarely on emergency managers. In the past, there has been a gap between Crisis Management and Consequence Management arrangements with a belief that they were quite separate activities. Crisis management is about anticipating, preventing and or resolving a threat or act of terrorism. This is the province of law enforcement agencies, supported as necessary by the Australian Defence Force. Consequence Management is a relatively new concept and is about protecting public health and safety, restoring essential government services and providing emergency relief to business and individuals affected by the consequences of terrorism such as the release of a chemical, biological or radiological substance. Consequence management falls to fire agencies, ambulance, State Emergency Services and the public health system.

While this latter group of emergency managers has no desire to be in the frontline of dealing with terrorist incidents, events of 11 September and the 'white powder' incidents that followed in Australia have demonstrated that Crisis and Consequence Management can no longer operate apart. The two must become more integrated so that there is a clear understanding between those involved in all aspects of an incident.

Planning for events such as the Sydney Olympic Games and the Commonwealth Heads of Government Meeting (CHOGM) has seen a narrowing of the gap between Crisis and Consequence Management. However, the new threat environment means that the gap must continue to close if all terrorist events are to be managed

in a holistic manner. Integration of Crisis and Consequence Management is occurring in some jurisdictions but this is an area in which we can still do better.

Australia prides itself on having sound emergency management arrangements. But these are optimised for the types of events which are normally expected to occur. One can only surmise how these would stand up to the type of catastrophic event that occurred in New York. While we hope they will never be tested in such a dramatic way, it is prudent for us to heed New York's lessons and, where applicable, incorporate them into our own arrangements. Information gleaned through the media; from recent visits to Australia by members of the Fairfax County and Miami-Dade Urban Search and Rescue Teams, which were involved with both incidents; and Mr Jim Hall, a geospatial specialist, who was involved with the World Trade Centre, have provided an indication of areas which warrant further consideration. These include being able to manage information to the satisfaction of a range of stakeholders, having access to specialist expertise, adequate training for managers and responders, having the right equipment and enough of it, and clearly defined incident management procedures at all levels.

There will be an opportunity in May 2002 to review our level of preparedness in these areas during a series of lessons learned workshops to be hosted by EMA.

The workshops will be based on the United States 11 September experience with the Federal Emergency Management Agency (FEMA) invited to provide suitable speakers. It will be interesting to see how our arrangements fare.

Rod McKinnon
Director Planning and Operations
EMA

Thredbo disaster Coroner's Inquest

Overview

On Wednesday, July 30th 1997 at 11.37 p.m. some '10,000 tonnes of soil slid down a Thredbo hill demolishing two ski lodges and killing 18 people' (Newman 1997). 'A whoosh of air, that sounded like a sonic boom and trees cracking, splitting the still, cold night air like gunfire. Alarm bells started ringing across the nation. Calls for help went out to all emergency services. No one could really believe the nature of the appeal; no one ever imagined a catastrophe like this could happen' (Diver and Bouda 1999, 53).

Three years later, on the 29th of June 2000, the New South Wales Coroner, Derrick Hand, published an exhaustive exemplary report (Hand 2000) of his inquest into the disaster. His task was to explain why the idyllic tranquility of a part of a most beautiful place had been replaced, almost instantaneously, by one of demolished building rubble. *Figure 1* clearly portrays the Coroner's challenging task. 'The sudden movement of slope material is as instantaneous as any earthquake event causing just as dramatic an impact upon property and lives' (Bryant 1991, 236).

'Until the Thredbo landslide tragedy there had been little public recognition that landslides were a significant threat in Australia. Where landslides occur, their physical impact is typically confined to a few properties or a short length of road or railway, but the effect can be disturbing or disruptive. Insurance policies in Australia do not normally cover landslide, and this can cause anguish to property owners. One landslide blocking a road or railway can cause inconvenience and economic loss' (Michael-Leiba 2000, 32).

The Thredbo tragedy has stimulated renewed interest in the risks associated with landslips (e.g. Landslide Awareness 1997; Landslip Workshop 1999; Ritchie and Hunt 2001; Walker 2001).

Recently, the *Cities Project* (A.G.S.O. 2000) of the Australian Geological Survey has instigated a multi-hazard risk assessments initiative aimed at reducing the risks posed by the range of geohazards in Australian urban communities (Granger 1999). This work is now bearing fruit, with some quantitative risk studies already completed. For example, that of the landslide-prone area of Cairns, about which detailed information is now available (Granger et al. 1999; Michael-Leiba 2000).

by Allan Skertchly, Hazard Mitigator, SMILE—Success Management, International Learning Enterprises, and Kristen Skertchly, Senior Environmental Scientist, Department of Lands, Planning and the Environment, Darwin, Northern Territory, Australia

Similar, not so comprehensive, but directly relevant and sufficient, landslide risk data was available for Thredbo. Had the geohazard information that was available been acted upon effectively, there would have been no such major landslide disaster at Thredbo, no untimely deaths, no Thredbo Coroner's inquest, no subsequent Coroner's Report (Shiels and Shiels 1991; Hand 2000).

'In several respects the Inquest into the Thredbo tragedy has no precedent. First, it concerned more deaths than had previously been considered as a result of a landslide in Australian history (Landslide Awareness 1997). Secondly, it was a disaster caused by a geohazard which affected an essentially urban community located in an isolated national park' (Hand 2000, 14).

'The Kosciusko State Park (the "Park") was created pursuant to the Kosciusko State Park Act 1944. The same Act created the Kosciusko State Park Trust (the "Trust"). The Trust had the care, control, and management of the Park. The Trust was given the power (inter alia) to carry out any work in connection with the improvement, development and maintenance of the Park, including the opening of roads, the erection of hostels and other buildings and structures' (Hand 2000, 18).

Nestled at the foot of Australia's high country, the home of the nation's highest mountain, Kosciuszko, Thredbo resembles a small European ski village, with lodges, restaurants and shops terraced into the steep hillside facing the ski fields. Through the middle runs the Thredbo River. About 200 kilometres south-west of Canberra, the nation's capital city, Thredbo is popular all year round-snow sports in winter, bushwalking and a range of sports in summer. Its reputation is world-renowned. Some three million people visit Kosciuszko National Park yearly (Diver and Bouda 1999,53).

The time taken to produce the report into the Thredbo disaster (three years) is a measure of the complexity of the issues and concerns involved and of the consummate thoroughness with which the Coroner executed his task of 'using death in order to save life' (Law Report 2000). The Coroner's Report is destined to become a classic study and should become an essential authoritative source and inspiration for all concerned with hazard mitigation in complex multifunctional modern human settlements set in challenging environments.

The coroner largely blamed government authorities, including the New South Wales National Parks and Wildlife Service (NPWS), for their laxity in failing to ensure that Thredbo Village was structurally stable. Crucially he noted that the NPWS should not have approved the laying of a water main along the unstable Alpine way, the road above the destroyed ski lodges. Damage to the pipe was a factor in the collapse of the road and in the landslide. The coroner noted his concern regarding the NPWS's ability to assess engineering issues, such as slope stability in relation to park roads. He also noted that the NPSW's difficulties were largely not of its own making, 'much being done by responsible government authorities over the years to try and keep the Alpine Way and other poorly constructed roads in the park operational. They had to struggle with problems occasioned by roads not designed for the purpose to which they were later put. The authorities were subject to funding restraints.' The coroner recommended an independent investigation into the NPWS's responsibility for urban communities and road maintenance in national parks such as Kosciuszko, which contains Thredbo. Potential litigation and the possibility of millions of dollars of *compensation are envisaged (Powell 2000).*

A hallmark of the coroner's approach is his overall interrelating systems and sub-systems approach and conceptualisation (Clarke and Crossland 1985; O'Connor and McDermott, 1997), within which the participating individuals and groups carried out their statutory and non-statutory duties and responsibilities. Although the malfunctioning pipeline was found to be the immediate cause of the event, building upon unstable sites

Figure 1: Top – Thredbo Village disaster domain before the 30 July 1997 landslide, looking towards Bimbadeen and Carinya Lodges (arrowed). Below – after the landslide.

without full geophysical assessments and fully engineered designs and constructions were also core contributory factors. The singular catastrophic Threbo event on that traumatic night in July 1997 was ultimately seen as a consequence of a long chain of antecedent events starting when the Snowy Mountains Hydro-Electric Authority (SMHEA) commenced construction operations in 1949. Painstakingly, meticulously, and comprehensively, Coroner Hand and his Office teased out and reconstructed the panoply of intertwining activities, dysfunctional decision-making and individual and organisational resource and capability limitations, that lead to the untimely deaths of 18 people.

With a sound legacy of prior coronial reports to underpin his Thredbo investigation, Hand, has produced another invaluable document, capping a distinguished career dedicated to making communities safer for others. Those who died did not die in vain.

There was one person who survived the Threbo disaster and lived. His name, now familiar to most Australians, is Stuart Diver. For 65 hours after the landslide, he was trapped deep under heavy building slabs and tangled debris, in a compact concrete catacomb, experiencing excruciatingly painful, freezing and wet conditions. Unable to move much, or initially communicate his dire plight, his dead wife lay beside him. After he was discovered, still alive and the sole survivor, 53 hours later, life-preserving aid and rescue took a draining further 12 hours for a very dangerous extraction from his near-death place. The work of the hundreds of emergency management workers was exemplary. Diver's personal observations and perspectives on the event are both insightful and inspirational (Diver and Bouda 1999; George 2000; Mills 2000).

The just cited writings convey a powerful picture of the personal impacts of the Thredbo disaster. Diver displayed a very

strong will to survive and exceptional *in situ* survival skills (Kay 1981; Drabek 1986; Leach 1994; Paton and Long 1996). Also most notable was the consummate, unrelenting dedication, and fine emergency management competencies and skills of the many persons involved in his rescue, long after the expectation of human survival was all but exhausted (Dawe 1999, Diver and Bouda 1999; Mills 2000; Hand 2000).

The rest of this paper will record in greater detail the essence and salient features of the Coroner's Report on the Thredbo disaster, and of the circumstances leading up to the traumatic event and the implications thereof for making our communities safer places in which to live. To convey best the essentials of the findings, a selection of the Coroner's own words will be used.

Role of the Coroner's Inquest

'The Inquest plays an important function as a fact-finding exercise, essential to investigate and answer the relatives' and public's need to know the cause of death free from the constraints which bind inter partes litigation. It does not apportion guilt. Although not expressly prohibited by the Act, it is not the function of a Coroner to determine, or appear to determine, any question of civil, let alone criminal, liability. I have made this point more than clear, I hope, from the outset of this Inquest. That said, however, it would be impossible in discharging my duties as Coroner not to analyse the evidence in the course of reaching my conclusions. A Coroner may make findings about any parts of the evidence in the course of the Report. Findings are not limited to those required by the Act. As a former State Coroner Mr. Waller has said, summing up should be universal practice' (Hand 2000, 10).

As it seems reasonable that the relatives, witnesses and public are entitled to know not only the verdict, but also what evidence was accepted and what weight was given to various factors from which the Coroner arrived at his conclusions. The summing up will give [the Coroner] the opportunity of making observations as to safety procedures, recommendations to public bodies, commendations for bravery, and for giving such warnings to the public as appear apt.

To collect the evidence and write the Report was a task of considerable complexity. Over 100 witnesses were called to give evidence. Sixteen bodies, with legal representation, were parties to the inquest; there were four expert

advisers to the Coroner who utilised five administrative staff; other parties and the public made verbal and written submissions. A wide range of government documents and reports covering a span of nearly half a century were assessed. The final Report consists of 206 pages of elegantly expressed, carefully reasoned analysis and assessment of the material, of commentary, and of recommendations, so meeting fully, the comprehensive and necessary public coronial fact-finding and analysis of the circumstances leading to the deaths.

The Alpine Way, Thredbo Village, infrastructure, private enterprises and public bodies

The Coroner's Report is structured into the following sections: introduction; the Alpine Way; Roads and Traffic Authority (RTA) as technical adviser 1991–1996; the development of Thredbo; the water main—construction; the Winterhaus retaining wall—construction; engineering cause; the water main theory; the retaining wall theory; the rescue; acknowledgements; findings; recommendations; and appendices. In the space available here a small sample only of the gist of the report is possible. Those whose mainstream interest is hazard mitigation and disaster prevention should read the report in full, as each section contains much of value. Here we aim to convey the essence of the Coroner's investigation, analysis and decision-making, findings and recommendations, and to elaborate further on the ekistic field of concern— the satisfactory conceptualisation, planning, design, construction, management and maintenance of safe and sustainable human habitats.

In his work the Coroner sought and obtained a comprehensive and objective account of many aspects of the Thredbo landslide. There is no indication that the central picture that has emerged has in any way been distorted by paucity and/or suppression of vital evidence. The common-place fear and trepidation of some witnesses to not be forthcoming, because of the possible attribution of blame, has been systematically overcome by the careful conceptualisation of the key issues and concerns before and during the evidential hearings; and the quality, meticulousness and openness of most witnesses, from whom multiple independent corroboration of all important details were always obtained. The result is evidence-based research, conceptualisation and coherent paradigm building at its best.

The immediate root cause of the Thredbo catastrophe was the failure of the Alpine Highway above Thredbo Village which initiated the calamitous landslide. This came about in spite of the clear and widely appreciated evidence that the road's instability in that location presented a serious ever-present unacceptable risk to lives and properties in the Village. The Alpine Way extends for approximately 1.3 kilometres above Thredbo Village. Throughout the history of the Village prior to the 1997 landslide, and despite comments made by many, that part of the Alpine Way was never reconstructed to improve upon the original construction road standards. Several reports were used by NPWS to obtain funds for road improvements along the Alpine Way, but those funds were not spent on reconstructing the highly unstable road above the Village.

There had been a continuing record of landslides. For instance, the first well-recorded landslide occurred in 1964 adjacent to Winterhaus Lodge in the Thredbo Village. This landslide possessed attributes similar to those that were to prove so fatal at Thredbo in 1997.

The Winterhaus landslide occurred on 2 October 1964. It involved the sudden slump of an outer segment of the fill on the Alpine Way above the Winterhaus Lodge through a vertical distance of about 6 feet. That slump was followed by a further vertical displacement to about 9 feet below the road pavement which occurred slowly over the following three days accompanied by a mudflow downslope extension at the toe of the landslide. Prior to the landslide occurring, cracks and differential settlement of the pavement of the Alpine Way had developed. They were accompanied by several small isolated water outflows from the fill down-slope of the road.

The Alpine Way was built by SMHEA during the construction of the Snowy Mountains Scheme in order to connect Cooma with Khancoban. It was considered essential for the Scheme's development in the Khancoban area. The SMHEA recognised that 'the terrain was extremely difficult for road building and that the road would only ever by used for light vehicle traffic'. According to SMHEA, the Alpine Way was constructed to a 'class A' standard, which was SMHEA's highest standard at the time. However, as SMHEA also points out, a class A standard road was never intended to be a main public highway. It was intended to be used as a construction road, a fact which was readily apparent. The SMHEA roads were

designed with the intention that they last twenty years.

'The fact that the Alpine Way was constructed with a view to being used primarily for a relatively short term purpose in connection with the Snowy Mountains Scheme had long term consequences when the road was later acquired by New South Wales for permanent use as a vehicular thoroughfare' (Hand 2000, 21).

The problems with the Alpine Way were well known and described by commentators throughout its history. Thus, in February 1974, Mr. Shaw, a former Commissioner of Main Roads, wrote of the road:

'The SMHEA construction access requirements necessitated road location on high plateaux and along very steeply sloping mountains and gully sides involving costly side cutting liable to slipping unless placed wholly in the solid. Very little of the latter was done...In many places the (roads) edge is supported against slip down the side slope of the ridge by logs of felled timber which were rolled or dragged into a roughly horizontal position. These logs are now rotting and slips will occur with increasing frequency' (Hand 2000, 21).

On 1 April 1968 the Alpine Way and other roads within the Park constructed by SMHEA became the responsibility of the New South Wales State Government. New South Wales accepted responsibility for maintenance and snow clearing of those roads on the basis that SMHEA was to pay the State an amount in respect of the roads constructed by SMHEA and required by the State for public use as well as being required for operation and maintenance of the Snowy Mountains Scheme. NPWS was responsible for the care and management of roads within the Park. In addition, the DMR agreed to act as agent for NPWS in undertaking snow clearing and maintenance of the roads on a priority basis. The question of providing protection within the Park and general management responsibilities connected with roads remained with NPWS.

The RTA has been responsible for the New South Wales main road system including the Snowy River Shire, throughout the period of the existence of the Alpine Way. It has done this in its various manifestations, first as the Department of Main Roads and then its successor, the Roads and Traffic Authority. At various stages throughout this period it was open to the State Government to proclaim or declare the Alpine Way to be a main road or one or other of a variety of other described roads. The effect of such a

proclamation or declaration would have been to bring the Alpine Way under the control of the RTA and to make it directly responsible for maintenance or construction works. Although this step was not taken prior to the landslide, numerous attempts were made throughout the history of the road to make the RTA directly responsible for it. These steps were unsuccessful (Hand 2000, 23). The RTA and its predecessor the DMR never expressly advised NPWS of the need to reconstruct the road adjacent to the village to avoid the risk of death or injury due to landslide. It is a matter of grave concern to me that a representative of the RTA inspected the Alpine Way, including above the village for a period of some 6 or so years from 1991 until 1996 and never recommended that the road above the village should be reconstructed (Hand 2000, 182).

The construction of some buildings on the extremely difficult site of Thredbo Village was itself seen to be wanting in normal building 'precautionary principles' (Harding and Fisher 1994). Risk analysis showed that, 'at the time of the Thredbo landslide, the risk of death from a mobile landslide at the Carinya-Bimbadeen site was over 2000 times the level suggested by the N.S.W. Department of Planning for tourist developments' (Hand 2000, 180). In spite of this, unsuitable building constructions proceeded in a number of inherently dangerous locations. In one such instance it was reported that 'in approving the site for construction, one person relied on his own engineering judgement. He did not ask for a soil investigation report. That, in his opinion, "was not an appropriate practice at that time", nor was it the practice for him to check the structural design of the building. He presumed that the architect and engineer who designed the lodge would ensure that it was safe and adequate for the site. Whether it was consistent with accepted hillside design and practice at that time was "up to the applicant" and a matter for NPWS. A number of buildings were actually completed and occupied before formal approval was ever given for them to commence' (Hand 2000, 81).

A similarly cavalier approach to the construction of an essential public utility was also in evidence:

'The water main was constructed in April-June 1984 through the uncompacted fill which comprised part of the Alpine Way. It was constructed of AC pipes with Supertite joints. The slope in which and above which it was constructed was subject to vertical and horizontal movement.

Supertite joints were not designed to resist pull-out forces. There are no extant design drawings or construction drawings for the water main. There are no 'as built' drawings. Construction commenced in 1984 before any approval was given. A stop work order was issued by NPWS. It is not known for how long the pipeline had been under construction or the extent of the construction before the stop-work order was issued. Approval was subsequently given by NPWS and construction proceeded. A drawing is extant showing the pipeline as having an approximate 90 degree bend near to the Schuss-Carinya boundary. The installation of an AC water main with Supertite joints in ground that was subject of movement meant that there was a risk that joints could separate and/or the pipe could break leading to leakage of water into the surrounding ground. The slope along the Alpine Way was marginally stable. Its continued stability depended on it being kept well drained. The construction of the water main jeopardised that marginal stability by introducing a potential source of continuous water flow in the event of leakage' (Hand 2000, 93).

The above samples of the very carefully gleaned and detailed evidence, highlights the woeful contemporary human settlement legacy pertaining at Thredbo Village leading up to July 1997.

In summary, the historical records and the evidence of witnesses disclose that in Thredbo Village:
- areas were being classified as 'slip areas/zones'.
- areas of the ground had slipped, or had the potential to slip, and were classified as posing a risk to the Village.
- at one time the lot on which Carinya was constructed was classified as a 'so-called unbuildable slip site'.
- officers of NPWS contemplated the possibility of a landslide of a magnitude of at least 200 metres in length occurring above the Village.
- a subdivision development was rejected on the basis the Alpine Way had to be reconstructed before it could proceed.

'Despite this, there appears to have been no awareness that any works should be undertaken to remove the risk from the Alpine Way or to undertake a systematic review of potential slip zones within the Village' (Hand 2000, 89).

Findings
In the Coroner's own words (Hand 2000, 5):

'A mass of evidence was led before me which established clearly that throughout

that period the Alpine Way fill embankment which ran for approximately 1.3 kilometres above Thredbo Village was in a marginally stable state and extremely vulnerable to collapse if saturated by water.

'The stability and geotechnical problems with the Carinya site were recognised and understood before any development of the Village in this area. At some later time, probably in the early to late 1960s, this knowledge was either lost, ignored or forgotten.

'I have found in this report that the landslide was triggered when water from a leaking water main saturated the south-west corner of the landslide in the fill embankment of the Alpine Way setting off the first stage of the landslide. The first stage impacted upon the eastern wing of Carinya Lodge. Simultaneously the first stage removed the support of the land to its east causing that, too, to collapse onto the lodges below.

'The causes of the tragic deaths which occurred as a result of that landslide are complex. I have found in this report that those causes are:
- the failure of any government authority responsible for the care, control and management of the Kosciusko National Park and the maintenance of the Alpine Way to take any steps throughout a c. 40-year period to ensure that the Village was rendered safe from exposure to that marginally stable embankment
- the approval and construction of a water main constructed of materials which could not withstand the movement which was taking place in the marginally stable Alpine Way embankment into which it was laid
- leakage from the water main leading to the saturation of the marginally stable Alpine Way fill embankment
- the Alpine Way fill embankment was in a marginally stable state because of the way in which it was originally constructed by the Snowy Mountain Hydro-Electric Authority for the limited purpose of use in connection with the Snowy Mountains Hydro-Electric Scheme

'My examination of the history of the road has left me with no choice but to come to the conclusion that the propensity of the Alpine Way to landsliding which could lead to destruction of lodges and serious injury to persons within them was known to those authorities throughout the relevant period. Despite this, no specific recommendation was ever made by those directly responsible for the road that would have led to the reconstruction of the road above the Village.

'I have been unable to resolve satisfactorily in my mind how the above hazardous situation was allowed to develop and continue for so long.'

The Coroner also found 'that, in my opinion, the Rescue Services performed an excellent rescue in all the circumstances which confronted them in July and August 1997. I do note, however, that neither the District and Local Disaster Plans ('DISPLANS') recognised the potential hazard of landslide in the Alpine area' (Hand 2000, 184).

Recommendations

The primary purpose of the Thredbo coronial inquiry was to ascertain an accurate account of the circumstances leading up to the 18 early unnatural deaths and make recommendations for the minimisation of similar events in the future. The Coroner made a number of pertinent recommendations. The following edited (for stand-alone clarity) abstracts convey the essence of these:

I recommend that the Minister for the Environment consider appointing an appropriate independent committee (to inquire into the responsibilities of NPWS) which I would expect would include, at least, representatives of Local Government, Road Authorities and the Planning and Engineering communities to undertake that review.

I recommend that the RTA examines its system of assessment of slope stability in the light of the lessons I would hope it has learned from this landslide.

I request that urgent consideration be given by NPWS to take account of Kosciusko Thredbo Pty Ltd (the head leasees) request concerning the removal of Alpine Way fill from above the western portion of the Village. If possible, it should provide a detailed explanation of what, if any, risk it sees arising from leaving that fill *in situ*.

I recommend that the Alpine Way and other Park roads inherited from the Snowy Mountains Hydro-Electric Authority which suffer from the same poor construction which affected the Alpine Way be monitored by appropriate experts in order to detect any areas of instability in the manner monitoring is now being undertaken above Thredbo Village.

I also recommend that the Alpine Way along its length, and the other like roads under the jurisdiction of NPWS, be subjected to regular and
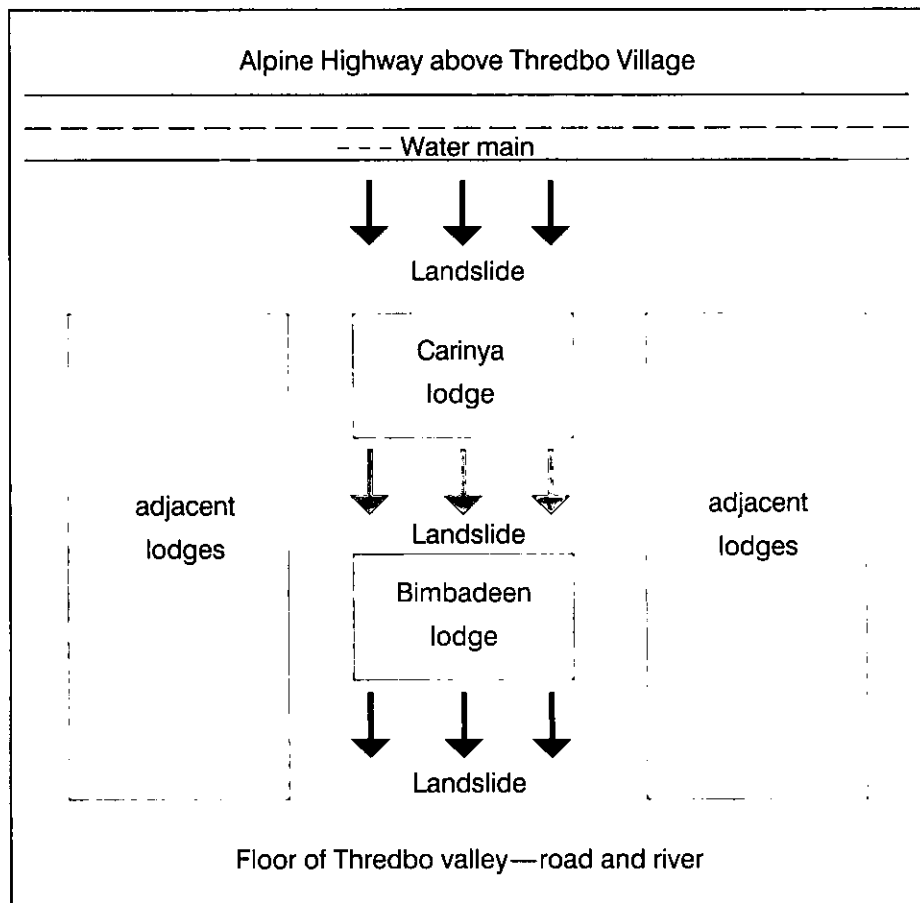
Figure 2: Schematic diagram of the Thredbo landslide. Water from the faulty leaking water main located in the unstable Alpine Way above Thredbo Village was the immediate cause of the disaster, depicts the Coroner's, immediate-cause of the disaster, findings.

expert geo-technical assessment.

I recommend that NPWS establish and maintain in a central location a record setting out a detailed history of incidents of instability and the like on the Alpine Way and other like roads under its jurisdiction which should include regular reports of problem areas and remedial action taken. I suggest that they be brought to the attention of NPWS with a view to any concerns in this respect being allayed as soon as possible.

I recommend that the Building Code of Australia and any local code dealing with planning, development and building approval procedures, be reviewed and, if necessary, amended to include directions which require relevant consent authorities to take into account and to consider the application of proper hillside building practices and geo-technical considerations when assessing and planning urban communities in hillside environments.

I further recommend that the report *Landslide Risk Management Concepts and Guidelines* (A.G.S. 2000) be taken into account in undertaking this exercise.

I recommend that both the District

and Local Counter Disaster Plans be revised taking into account the risk of landslides in the Alpine area and their management.

Having regard to ... the increasing likelihood of slope instability as development in hilly areas increases, I commend to the authorities revision of all emergency plans to ensure they reflect appropriately the risk of landslides in the relevant area.

The above wide-ranging recommendations, when acted upon, have the potential to substantially reduce the landslide risk factors in Thredbo and similar locations. Such desirable changes are not easy to implement and their timely and effective applications are by no means assured. However, notwithstanding any beneficial changes that may stem from the Coroner's findings and recommendations, considerable work has been completed overseas (Maybury 1986; Wilson 1991; Smith 1992; Blaikie et al. 1994; IDNDR 1995; Munasinghe and Clarke 1995; Burby 1998; Elms 1998; Godschalk et al. 1999; Ingleton 1999; Mileti 1999) and in Australia, to formulate and implement much-improved guidelines for risk management (Standards Australia 1995, Zamecka and Buchanan 1999), sound land usage (Graham 1998) and building

and infrastructure construction (Wilson 2000), at locations posing evident concerns over endemic geo-hazards (Granger 1999). The Hazard Mitigation Working Group of Emergency Management Australia is at the forefront of work in this area (HMWG 2000).

Critical Issues Exposed by the Report

'Great blunders are often made, like large ropes, of a multitude of fibres' (Victor Hugo 1862).

As part of his findings, the Coroner (Hand 2000,184) stated that he had been unable to resolve satisfactorily in his mind how the extremely hazardous propensity-for-landslide-disaster situation at Thredbo Village had been allowed to develop, and continue without rectification, for so long.

Walker (2001), on behalf of the NSW Government, has already made recommendations concerning improving arrangements for government management of remote urban communities and the maintenance of their access and connecting roads. And the emergency management responses and recovery processes have been the subject of several detailed examinations (State debrief 1997; Westerway et al. 1997; Dawe 1999).

Here we will, *inter alia*, explore the Coroner's core concerns and findings further, seeking to shed light u pon, and further clarify, the intricate web of pre-disaster-contributing critical issues.

The Thredbo Coroners Report (Hand 2000) highlights many important factors impacting upon the design and management of human settlements in complex contemporary societies (Cutter 1993; Dumas 1999; Eisenberg 2000; Friedman and Friedman 1985; Higgins,1980; Laver 1981; McConnell 1988; Mishan 1967; Perrow 1984; and Stein 1985). These factors embrace the endemic difficulties of inertial and resource-stretched modern governments, and public and private bureaucracies and organisations, faced as they are with managing complex technological and other systems and sub-systems (Skertchly 1968; Hall 1972; Skertchly 1977; Clarke and Crossland 1985; O'Connor 1997; Zeffane 2000b), particularly in the fast-changing, 'economically rational', profit-seeking, capitalist world (Mishan 1967; Soros 1988; Shutt 1998; Shiel 2000).

In general, the greater the magnitude of death, injury and destruction the greater the psychosocial impact. Although natural disasters, such as cyclones, can create greater levels of destruction and loss of life, their psychological impact is often less than technological events (e.g.

structural failure, mechanical breakdown) or human-induced events (e.g. human error or deliberate sabotage) because the latter are believed to be more preventable.

Technological or human-induced events on the other hand trigger heightened feelings of anger and focus attention on the attribution of blame to those perceived to be responsible. Their period of impact may be prolonged as a result of legal proceedings, the apportionment of blame or responsibility and compensation issues. Consequently, people may find themselves facing constant reminders of the event and their role, prolonging the period of impact and slowing the recovery process (Paton and Long 1996,115).

The Thredbo disaster was a human-induced event directly attributable to multiple human mistakes

There is an extensive technical literature upon land instability as an important geohazard (Sharpe 1975; Crozier 1986) and the characteristics of slopes (Young 1972; Chowdhury 1978; Finlayson and Statham 1980). This literature was available for use by the NPWS, RTA, SMHEA and Kosciusko Thredbo Pty Ltd, the 'head lease' developers and land users, well before 1997.

The quality of human settlement in Thredbo Village over the past forty years has been adversely impacted by unclear determining, planning and consent authorities; lax building designs, approvals, constructions and maintenance; frequent lack-lustre engineering, hydrological and geo-technical advice; a lack of community awareness of the real levels of environmental risks; and a lack of well-informed, trained and prepared emergency capabilities and rescue resources for possible landslide and other catastrophes.

From time to time voices were heard from some well-informed engineers, planners, and geo-technical experts. For example, Bright, James, Huggett, Lloyd, Moye and Sinclair Knight and Partners, all gave corroborated evidence appreciating the real risks involved in living in Thredbo Village (Hand 2000).

Such initiatives may today be assisted by sophisticated modelling of geo-hazards (Granger et al. 1999; Michael-Leiba 2000; Smith 2000). McEntire (2000, 58, 61) too, champions the cause of minimising human settlement vulnerabilities by adopting a pro-active hazard and risk reduction planning ethos. He affirms that 'invulnerable development is development pursued in such a manner as to address vulnerabilities, and thereby

decrease the probability that social, political and economic progress will be set back by disaster…what is needed is a form of development that reduces disaster vulnerabilities in order to avert the reversal of social, political and economic progress'. Such an approach, which should be mandatory, requires that appropriately qualified and skilled technocrats, working in well-resourced technocracies, are both enabled to perform their duties with integrity, and also empowered to cause the implementation of their outputs and findings, where these are evidentially well-founded in accordance with established planning and precautionary principles.

But whatever the quality of sound earlier advice on the vulnerability to disaster of the Thredbo settlement, the sporadic Thredbo warning voices were generally much muted, often to the point of extinction, by the indifference and/or inabilities of influential others, who possessed the authority and power, to remedy the situation (Higgins 1980; Friedman and Friedman 1983; Hand 2000).

Within many organisations the most competent technical people may not readily be able to have their well-founded views taken up and acted upon. Many technocrats work in organisations where the best plans are not necessarily the ones that are operationalised. Another factor is the cultural and value system pertaining within many private corporations and public bodies where, for example, 'up to 30% of contemporary workers in a representative sample of Australian organisations do not trust their bosses' (Zeffane 2000a, Zeffane 2000b). Also, 'some people in bureaucracies may deliberately edit out information or data that would highlight their errors or failures of judgement' (Dumas 1999).

So, where there have been would-be whistleblowers, it has generally been very difficult for them to act in the interests of the community. Had this been possible, some landslide risk-aware people may have been listened to and their advice acted upon, so averting the tragedy of Thredbo 1997 (Shiels and Shiels 1991). Today, too, much-improved know-how concerning persuasive and optimally effective counter-disaster alerting and preventative advocacy communications and procedures, is available to support such initiatives (Martin 1999; Vinten 2000).

Over the last half century, as the Coroner's detailed examination of the Thredbo Disaster has revealed, there has been an appalling continuing history of unacceptable administrative and engineering practice, and inappropriate land

Goal confusion	At no stage was there ever a clear conceptualisation of the detailed nature of ultimate Thredbo Village and its essential services and critical infrastructure needs. At the outset, the authorities were concerned only with basic temporary construction camps accessed by temporary roads and communications. This ethos continued.
Institutional Peter Principle	The various agencies were expected to perform tasks beyond their levels of competencies and resources. There was never available adequate professional land usage and township planning expertise; the Alpine Way was never designed, constructed and maintained for the purposes it was later required to perform; and the design, construction and monitoring of the watermain was seriously deficient.
Insufficient human technocratic competencies for necessary tasks	The competencies of available field staff over some four decades varied widely. As well, some of these key staff sometimes did not have either the time, or access to suitable resources, to perform the duties adequately.
Lack-lustre administrative and managerial staff	There was an absence of high-calibre, capable and responsible leadership in lead agencies. Institutional inertia, lack of openness and trust, and under-resourcing, contributed to suppressing safety issues.
Lack of accountable, responsible and prudent, public and private sector management	Both the public and private sector organisations evidenced serious levels of disregard and haphazardness over executing their work in ways which would meet sound contemporary standards.
Disregard for technocratic staff advice	Where sound assessment and performance advice on current and future hazards was produced by field workers it was not ever sufficiently operationalised by the authorities to reduce the risks associated with the evident hazards to acceptable levels.
Non-observance of laws and regulations	Even where they existed, in many instances little or no attempt was made to comply with extant legalities. There were cases of dubious post-hoc construction and building approvals.
Linked public and private sector culpabilities	Public bodies worked aberrantly as excessively closed and technically under-resourced entitities; private corporations displayed disdainful disregard for due process compliance.
'Out-of-sight, out-of-mind'	The small Thredbo Village and it's activities were located in a relatively remote bushland area and were of direct concern to but an elite few, some of whom were not overly regulation-bound. The State was pre-occupied with major development issues elsewhere. Thredbo human settlement safety was not an evident priority.

Figure 3: Antecedent institutional causes of the Thredbo landslide disaster.

usage associated with Thredbo Village. These have included unsafe utility installation, inappropriate road usage, insufficient road maintenance, building upon unstable sites, inappropriate building designs, and building without authorisations.

Sound contemporary planning, construction and human settlement management regimes, have often not been adhered to. Hand (2000) details many such instances in his Report , some of which have already been cited. Where suitable regulations did exist, they were often disregarded and/or simply not enforced; unfounded assumptions were made as to the efficacy of existing plans and procedures; and where sound advice was forthcoming, it was generally ignored or not sufficiently, or ever, acted upon. For much of the pertinent time the Coroner found evidence of inappropriate land zoning and observance of building regulations including that 'there were no requirements for engineering reports in relation to building work' (Hand 2000, 85). From the outset, the Threbo community did not possess an orderly and carefully orchestrated approach to safe and sus-

tainable human settlement. Although the Coroner reports gradual improvements in planning and development arrangements, these came too late to mitigate the Thredbo catastrophe.

The ultimately death-dealing, in part dysfunctional, human settlement development value system and operational malaise was evident in parts of both the public, Kosiusco National Park Thredbo development managements and involved public bodies. The leaking pipe along Alpine Way need not necessarily have lead to the disaster, had pertinent other aspects of the Thredbo settlement's plans, designs, construction and approvals regime been adequate.

The serious geo-hazard know-how and action deficiencies revealed by Thredbo, are being even more exacerbated in many public bodies today, by deliberate government policies of 'right-sizing' and outsourcing and 'doing more with less' (Bell and Head 1994; Brain 1999, Hancock 1998; Sheil 2000; Sturgess 1996; Yates 2000a; Yates 2000b). This is of vital concern in private enterprises and public bodies whose optimum functioning and decision-making requires high levels of advanced engineering and technical expertise (Yates

2000a; Yates 2000b). When, as has happened over the past decade, public utilities have had their engineering and other in-house capabilities progressively reduced, the potential for much-enhanced hazard generation leading to increased risks concerning vital human safety issues has caused (and continues to cause) considerable individual and public disquiet (Dumas 1999; McEntire 2000; Sheil 2000; Stein 1985 and Perrow 1984; Yates 2000a; Yates 2000b).

Yates (2000a, 2000b) has recently analysed and directly confirmed the above engineering/technological skill deficiency concerns in the Australian environment. In a troubling statement (Yates 2000a, 5), he observes that:

'Over the last decade, government bodies have been reduced considerably in size. This has resulted in a corresponding decrease in the number of specialists, including engineers, where there has been a 20% to 40% reduction in the Commonwealth, State and Local government public sectors. The loss of technical expertise in Australian governments increases the risk that contracts for engineering, information technology and other technical goods and

services, will not achieve government or taxpayer expectations. Since the departure of many technical specialists, the focus on improving contracting skills has overlooked the growing problem of a decline in technical expertise. Consequently, governments need to adopt new approaches to ensure that they have access to the technical expertise required to be an informed buyer of technology.' And apropos of Thredbo, facilitate the building of safer communities.

Yates thus provides additional broad confirmation of the accuracy of the Coroner's portrayal of the causes of the Thredbo catastrophe and of an important societal malaise that needs to be addressed.

It is evident that in the increasingly intricate, interdependent, technological societies in which we live, there will be on-going complex catastrophes of many kinds to contend with (Dumas 1999; Perrow 1984). Hopefully, many others will ultimately benefit, after able coroners like Derrick Hand, in their quintessential risk-preventative roles, determine the causes of unnecessarily high-risk early deaths (Hand 2000). And leading-edge techno-crats, within adequately funded, managed and resourced, competent, 'world best practice' organisations (Linstone and Mitroff 1994; Linstone 1999; Mayo-Smith

and Ruther 1986; Pirages and Sharpe 1996; Stephens 1998 and Svieby 1997), will operationalise, with alacrity, coronial recommendations for societal improvements (Elms 1998; Heath 1998). The great challenge ahead is to construct and manage sustainable human settlements that are as safe as possible (Cutter 1993; Henderson 1999; Marien, M. 1996; Pirages and Sharp 1996).

Figure 3 summarises the main historical constituent causes of the catastrophe, so elucidating the Coroner's earlier expressed concerns.

A note of caution is also pertinent. 'All human/technical systems are unavoidably subject to failure. Design errors, flaws in manufacturing, mistakes in maintenance, and the complexity of modern techno-logical systems conspire to make them less than perfectly reliable...yet there is often a *good-news syndrome*' confirming a psychological bias toward wanting to believe that there is a higher degree of predictability (and safety) in situations than actually exists' (Dumas 1999). Safer human settlement futures entails accom-modating such complex matters as have been outlined in this paper, better.

Table 1 summarises the overall Thredbo problematic and possible remedies. The principal source of the key issues is, of

course, Coroner Hand's Thredbo Report.

Table 2 provides some core guidelines to facilitate the design, construction and management of human communities at acceptable current and future levels of acceptable risk for their users and residents. Many important policy, planning and operational changes are needed (Dumas 1999; Elms 1998; Hardy and Fisher 1994; Marien 1996; Pirages and Sharpe 1996). There is currently much 'safety in human settlements know-how' available that is not utilised appropriately and optimally. The task of bringing about significantly improved human-safety-directed regimes in contemporary multi-faceted and pluralistic human societies and settlements is clearly an important and challenging one.

In conclusion, we affirm that dysfunc-tional human experiences are often the mother of beneficial invention (Reed 1996). It is from such experiences that enlightened, motivated, and resource-adequate, communities, can plan and practice more effective hazard identifi-cation and hazard mitigation, and thus risk reduction, so facilitating enhanced quality-of-life-maintenance and/or enhancement, for all concerned (Silverstein 1992; IDNDR 1995 1999; Elms 1998; Heath 1998; Ingleton 1999; Skertchly and Skertchly 2000).

Factor	Dimensions	Issue	Remedy
Human inertia	Complacency	Lack of response to evident need for safe action	Accountable openness to necessary change
Human incompetence	Unsound knowledge and skilling	Inability to understand and suitably act	Monitoring of 'acceptable-only' performances
Not using best available advice/know-how	Ignoring the best available advice/know-how	Not acting upon the best available advice/know-how	Championing/rewarding superior technocrats
Whistleblowers	Vital warnings	Facilitate usage	Officially utilise
Dangerous management of technical complexity	Lack of ability to understand contemporary socio-technical work systems	Incompetent technical leaders managers and decision-makers; political policies	Rigorous initial selection and on-going relevant skilling/renewal training programs
Human skills under-resourcing	Absent/over-stretched resources	Unavailability of required competencies	Adequate human competencies to match needs
Physical resource deficiencies	Absent and/or obsolescent equipment	Work tools insufficient for sound work	Sound work equipment to match work needs
Disregarding established planning guidelines	Disregarding proven planning building and land-use criteria	Not conforming to established sound policies and practices	Instigating modern operational procedures
Disregarding coronial recommendations	Ignoring well-founded coronial advice	Using well-founded coronial advice	Responding to coronial findings with alacrity
Absence of application of the 'Precautionary Principle'	Prudent pro-active, realistic situation audits/actions	Non-application of sound plans and operations	Building a 'safer communities culture' for less vulnerable futures

Table 1: Thredbo Disaster—key issues and solutions.

Feature	Characteristics	Authorities
Land lot(s) info including all known potentially serious hazardous features and risks details	Obtain two corroborating independent-expert detailed land data sets: specific locational and contiguous land history current and futures profiles	Australian Geological Survey; State and Territory Lands, Planning and Environment bodies
Hazard analysis: entity disruption, severe property damage, human injury & death risks	Specific formulation of the like-lihood (probability) of impact of serious hazards: e.g. 1) annual risk of major structural damage, 2) annual risk of death	Recognized geo-hazard agencies and technocratic (engineering and techno- logical) specialists with current competencies
Safe design of the fabricated human infrastructure: roads utilities, buildings etc in urban, rural and remote settlements, matched to locations	Only commission designers of proven integrity, competence and performance record; have all core human safety design features independently confirmed by equally competent technocratic professionals	Government/expert body mandated and licensed experts with established and up-to-date records of leading edge (world best practice) designs (and subsequent constructions)
Construction: the progressive safe fabrication, to design specification, of human settlement artifacts and entities	Verify and certify all vital construction features to comply with all design plans, statutes, regulations and contemporary benchmarks; confirm core safety with another assessor	Licenced, reputable, competent, independent construction assessors and inspectors, overseen by an adequately staffed official monitoring body
Human-safe settlement management: Sustainable, safe, affordable, on-going settlement viability; working to attain community-approved safety benchmarks through progressive improvements	Institute on-going, open, accountable, monitoring and informing, on all core human safety aspects and hazards/risks of the natural and built environments. Incorporate human safety considerations and standards as essential components of all settlements using current and emergent knowledge and understanding	Open, accountable (with F.O.I.), competent governments and public bodies e.g. Emergency Management Australia and Counter Disaster agencies; State Territory and Local Governments and community leaders; adults, owners, operators, shareholders, managers

Table 2: Application of 'The Precautionary Principle' to maximize human settlement safety in environments with known hazard propensities.

The Thredbo Report of Coroner Derrick Hand (Hand 2000) is highly commended to all politicians and planners; engineers and technocrats; hazard mitigators and counter-disaster and emergency practitioners; and people generally, who seek to improve the safety and well-being of contemporary and future human settlements. Prudent proactive hazard mitigation saves lives.

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For the 'valuable contributions to building safer communities' the authors were recipients of the Inaugural and 2001 Safer Communities Awards conducted by Emergency Management Australia.

This article has been refereed

Book Review

Human Error—by Design?

by Simon Bennett, Director of the Distance Learning Msc in Risk, Crisis and Disaster Management at the Scarman Centre, University of Leicester.

Published by Perpetuity Press
53pp, ISBN 1 899287 72 8

Reviewed by Macarthur Job,
Air Safety Consultant and Author

Almost from the dawn of aviation, so-called 'pilot error' has been an all-too-glib ascription of cause in the investigation of aircraft accidents.

In this little volume, Dr Bennett, a British sociologist specialising in risk, crisis and disaster management, examines the view that while an error of judgement on the part of an aircraft crew might often be the final link in a chain of unfortunate or ill-timed incidents that lead inexorably to an accident, the whole cause process is far more complex.

Factors such as operational requirements, crew training and discipline, crew relationships, air traffic control considerations, aircraft maintenance, aircraft design, and airline management can all impinge on circumstances that bring about an accident. Thus, while the final act that precipitates the accident may be one of crew reaction, the underlying causes may lie far back in the accident process and be quite beyond the control or influence of the pilots.

The book is divided into three sections. In the lengthy introduction, which occupies almost half the book, the author presents his case, continually backing his detailed argument with references and quotations from other writers and authorities on the subject of air safety, all of whom are listed alphabetically with their work, at the end of the book.

The second section, Case Studies, then seeks to reinforce the points made in the Introduction by examining one military and five civil aviation accident situations, all of them well known in past years, which illustrate 'the potentially complex and unpredictable aetiology of aviation accidents and disasters'. The book ends with a Discussion and Conclusion section in which the findings of the six case studies are analysed, again with frequent reference to the comments of other world authorities — and conclusions are drawn.

Overall, the author presents a convincing argument which could well make 'a positive contribution to air safety at a time of rapid growth and development', as he puts it in outlining his objective in the opening paragraph of the book (his words were of course written before the world-changing events of 11 September).

However, all the accident histories considered in the book are more than 30 years old and, in the case of two of the studies, go back to the 1950s. One wonders why the author has not considered the circumstances of more recent accident investigations to illustrate his points even more effectively. The Air Ontario F-28 accident at Dryden in Canada in March 1989, would have been a particularly good example. The background to this accident was so complex that the Privy Council of Canada appointed a special judicial Commission to inquire into its 'contributing factors and causes...', the final report after hearings extending over more than six months, running into four volumes.

Nevertheless, in the field of 'human factors' as they apply to catastrophe management, Dr Bennett undoubtedly achieves his stated goal. Indeed, if widely read and heeded, this work could also do much to counter the all too predictable tendency on the part of the general public and the media to jump to the conclusion of 'pilot error' in the majority of aircraft accidents.

But for a book which is presumably intended for the aviation industry as a whole, it seems a great pity that the style in which it is written will have little appeal. Despite the words of the blurb on the back cover, the text gives the impression of being more a scientific paper than a book.

The language will be unfamiliar to those unaccustomed to academic papers, and the frequent references (some of them unnecessarily pedantic) which appear in parenthesis throughout the text, continual break up the flow of the argument, in effect playing havoc with its readability. This is regrettable, for the content is important, and would otherwise be of interest, both to the aviation industry, as well as to a much wider public audience.

At the same time, from the point of view of the informed industry reader, some of the aviation terms used will raise eyebrows. The author's habitual use of the hackneyed newspaper jargon 'plane' when he means 'aircraft' seems hardly appropriate to a serious aviation industry publication, and his choice of the word 'velocity' in some places instead of the clearly meant 'airspeed' is technically incorrect.
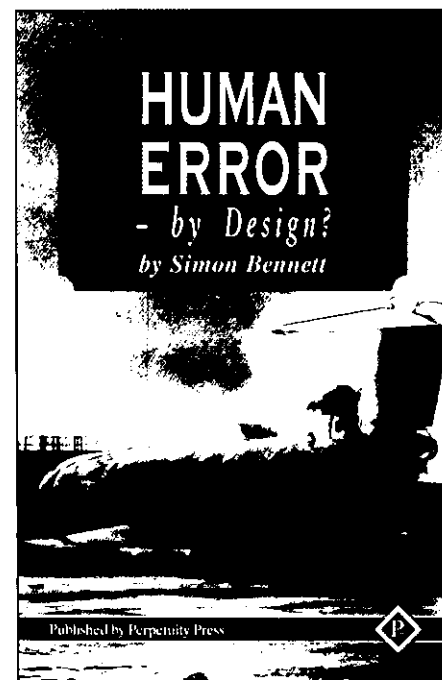
In a few places also, there are irritating 'explanations' in parenthesis which 'talk down' to the reader, eg.: 'An aircraft stalls when it is flying so slowly that the wings cease to provide adequate lift. A stalled aircraft will fall from the sky. Recovery is not always possible.' One would hope that most industry readers would be familiar enough with so basic an aerodynamic phenomenon as not to require this elementary lesson,

This reviewer believes strongly that, in any written work, readability and ease of comprehension should be a first priority. As one magazine editor would constantly remind his writers: 'No matter how good the story, if no one's going to read it, you might as well not begin.'

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Managing community vulnerability in a wide area disaster

Introduction

In this paper I want to reflect on the gas shortage that occurred in Victoria in 1998 and to consider some of the strategies and programs and methods used to deal with the event and to support the community.

I also want to indicate some of the lessons that were learnt by Government, public administrators and the community from the shortage.

This list of lessons is incomplete. The constraints on the length of this paper has required to select only some of the lessons learnt. But also lessons are still being learnt, new methods and systems applied and tested and new arrangements developed.

Perhaps the biggest issue to have come from the gas shortage is the understanding that public utilities[1] are fragile. And that if they fail through sabotage, accident, wear and tear or overload then the consequences for the community, and for the agencies and services that support the community, can be acute, widespread and protracted.

Perhaps the greatest assets we possess in dealing with these events are the experience, expertise and commitment of politicians, public officials and Non-Government Organisation (NGO) staff. Their professional attributes can only be used successful in a community which values and practises trust, mutual support and socially responsible behaviour. Without this broad culture of personal trust and support allied with professional expertise and political commitment to equity and social support any arrangements to deal with disasters and crisis will find management of the issue significantly more difficult, if it is achievable.

Reflection on the nature of disaster [2]

Hazards agents as external and independent phenomena

Most disaster management arrangements are developed to deal with events that are, in significant ways, external to the society that is impacted. Floods, wildfires and cyclones for example, although influenced by human modification of the environment, are usually caused and driven by atmospheric or geological processes that are more or less independent of human activity.

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These arrangements, with modification, can often deal with other types of events but require a degree of fine-tuning and an understanding of different types of impacts and consequences.

This issue of the versatility of emergency management arrangements came to the fore in 1998 when an explosion at a gas producing plant in Eastern Victoria effectively halted gas production in Victoria.

For the first time a major event had occurred that was intrinsic to the way in which the society and economy is constructed. For Victoria, despite the earlier 'warnings' around the loss of electricity to central Auckland and the Sydney water crisis, the gas shortage in September 1998 came as an awakening to Government and the emergency management community. It affected most of the geographic area of the State, and it had a direct impact upon 1.8 million households that were without gas, as well many manufacturing and commercial enterprises that lost gas supplies and therefore had to close operations or to restrict their activity.

The first issue, therefore, was the unexpected nature of major and widespread utility failure. The greater part of the Victorian population was effected and Government, disaster management agencies and the entire community were confronted by a situation where the whole jurisdiction was affected. The significance of this, and this is a major learning from this event, is that there was, in effect, no other source of assistance.

The experience of being dependent on limited internal resources or on resources only available from outside to support disaster operations seems to be common in some developing countries. These societies have limited resources to begin with. Significant resource constraint is, however, almost unknown in developed, industrial societies.

Utilities are generally taken to be the community services of gas, water and

electricity, but my remarks are equally applicable in most instances to other public services without which contemporary life would be difficult and or more hazardous. These additional services include public health services, such as sewerage systems and clean and safe food and water, medical and hospital services, medical and pharmaceutical supplies as well as personal and community support services that support the disabled, the ill and disadvantaged and those with needs that cannot be readily met from their own or local sources.

Dealing with vulnerability

Another salient issue with dealing with wide area events is that, by definition, they affect large areas and so in important ways limit access to response, recovery and support services and resources.

Previously, diasters in Australia have affected only part of any given State. On this occasion effectively the whole of Victoria was impacted. Existing emergency management arrangements provide for escalation of support arrangements, resource supply and distribution, in so far as whole municipal areas may be (and have been) affected by diasters. On this occasion the arrangements were not fully appropriate because, under Australian arrangements, the States are responsible for

Notes

1. These can include gas, electricity, water, sewerage, medical, pharmaceutical, telecommunications and food services and supply arrangements. This is not a complete list. Work is underway to progressively identify essential services and infrastructure (and not just physical infrastructure) and the vulnerbailities and coping capacities of individuals, groups and communities.

2. In this paper I use the words 'disaster', 'crisis' and 'emergency' interchangeably. The gas shortage is often referred to by the Politicians and government officers who contributed to its management as a disaster, but also sometimes as a crisis or an emergency. Use of particular terms seems to be a matter of personal preference. There is, in any case, a high degree of overlap between the meanings of these words, even for pedants. And given the state of loosely applied definitions—or even competing or absent definitions—in this area it seems to me that we can assume that there is no harm at this time to taking the words to be synonymous. Clearer definitions would, however, be helpful. So long as they still connect with the real world. When events such as the gas crisis/disaster/emergency occur they strain at our glossary because they are new types of phenomena for which we have to modify or create new descriptions.

emergency response and recovery. Support is available from the Commonwealth under certain conditions and support may be provided by other states. But the final responsibility lies with the States. In this situation Victoria had to deal with the event, loss of gas to the greater portion of its' population, by itself.

This event also drew out in ways that had not been anticipated before, that certain types of people (for example, those on life support systems, those receiving acute medical care at home) are especially vulnerable to particular types of loss, damage or disruption.

Through this event a better, but by no means complete, understanding of the nature of individual, household and community vulnerability was achieved.

In this event vulnerability was heightened by a number of issues. The sheer number of people affected, the lack of an easily obtainable alternative to gas and the importance of gas for certain services (such as particular life support systems).

Background to the gas shortage

For Victoria, despite the earlier 'warnings' around the loss of electricity to central Auckland and the Sydney water crisis, the gas shortage in September 1998 came as an awakening given the area it affected and the proportion of the State it had an impact upon. 1.8 million households were without gas, as well many manufacturing and commercial enterprises lacked gas and needed to close operations or to restrict their activity.

The situation of restricted gas availability occurred after an explosion and fire at Esso's gas refining plant at Longford in Gippsland in the East of Victoria.

The deaths and injuries that occurred were sufficiently serious and tragic in themselves for this to be a major emergency and this how it was, quite correctly, perceived initially

Within 48 hours, however, it had become apparent that there was a another, wider priority that had to be addressed, being the supply of gas to the better part of the Victorian population and the integrity of the gas supply infrastructure if the gas supply was entirely lost.

In the event, the gas supply was cut off, but sufficient gas remained in the system to ensure that the gas distributing pipes were not damaged or compromised, that system integrity was maintained and that certain critical medical needs could, for the time being, be met.

This residual gas was supplemented by 12% of Victoria's needs being made available from New South Wales through a recently installed connection. This was to be vital in the management process. The then Government established the Central Government Response Centre (CGRC) to coordinate policy and program planning at State level and the Department of Treasury and Finance (DTF) and the Victorian Energy Network Corporation VENCorp worked with Esso to manage the reduced gas supply

Had there been a total loss of gas to the system then the gas-distributing infrastructure may have been damaged as well as the system itself requiring days or weeks for restoration to operational capacity when gas became available again.

The Victorian Emergency Management Council (VEMC) the peak emergency policy advisory body in Victoria met with enhanced membership to consider the emergency management implications and the Department of Human Services established its own coordination arrangements. It was not entirely clear that this was an emergency that could or should be dealt with by the existing arrangements, but the VEMC maintained monitored the situation and played a supporting coordinating and liaison role to the CGRC

Forty-eight hours after the explosion emergency management confronted with 3 separate issues, all of which were related and all of which required immediate attention by government:
- maintaining the integrity of the gas distribution system
- maintaining essential services such as hospitals
- providing support services to the community

Impacts

Immediate impacts

Immediate impacts of the event include the deaths and injuries at Esso's plant at Longford in Gippsland and the CFA's efforts to control the fire. Gas restrictions that affected 1.8 million households as well as small business and industry across Victorian were applied almost immediately.

The significance of the loss of gas supply did not become fully apparent for up to 48 hours.

Longer term impacts

Longer term and continuing disruptions flowing from the cessation of gas production included changed domestic routines, in particular for cooking, heating and washing; layoffs of staff where industrial plants required gas to function; business disruption and temporary closures where gas was required for cooking or other services.

By extrapolation we could see that these impacts had the potential to amplify and run out of control if the crisis was not managed and if supply was not resumed within a reasonable period.

Loss of industrial and commercial activity could impact on the enterprises themselves, as well as on the families affected by lay-offs and stand downs and plant closure. Some gas supply infrastructure, industrial equipment and even some domestic heating equipment was potentially affected by loss of gas pressure, by shutting equipment down and by the restart process.

There were potentially long-term consequences for the society and the economy of Victoria.

In particular certain special needs groups such as the frail aged, newborn infants and other required additional support or exemptions from gas restrictions. For these groups gas was an essential part maintain day to day health and safety. Prolonged lack of gas — or in some cases even short-term loss of gas — could have dire consequences.

Overview — responses and support programs

Government response

A 'total system failure' such as the loss of gas had not been envisaged and so was unplanned for in its detail, although existing disaster management arrangements did address some elements of the matter. To ensure that a whole of government approach was applied, to ensure effective communication, proper coordination and appropriate sharing of resources the Government established a Cabinet Task force as well as the Central Government Response Committee. Chaired by the head of the Department of the Premier and Cabinet, this committee was composed of heads or deputy heads of relevant government agencies and the gas regulatory authorities. As well the Government's agencies responsible for gas supply and natural resource management met regularly with the gas distribution companies and Esso to facilitate control of the fire scene and then repair and restore the gas supply.

These arrangements worked effectively at a senior level through a shared sense of purpose and vision generated and driven by the Government.

Maintaining essential services

The critical essential services reliant upon gas were acute care and health services

including hospitals, residential nursing homes and supported accommodation of various types. These institutions needed gas for heating, sterilising equipment, washing of linen and food preparation.

Support to these was provided by an industry coordination centre established by the Department of Human Services (DHS) which worked through DHS regions and the hospital networks to;
- coordinated alternative suppliers or sources of food, cleaning and washing services
- coordinated the rapid installation of alternative power supplies such as diesel power electricity generators
- provided advice and information to institutions and back to Government

This support was coordinated by an industry support centre, established from scratch, at the head office of DHS in Melbourne.

On the gas supply/infrastructure repair side the Department of Treasury and Finance (DTF) and the Victorian Energy Network Corporation (VENCorp) worked with Esso to manage the reduced gas supply and to restore the gas production plant to working capacity.

Providing support services to the community

The task described above were difficult enough in their own right given that an event of this scale, and affecting such a large proportion of the population had not been specifically planned for.

Managing support to the community, one of the arms of the government's response , was even more complex. Some of the salient aspects of this response were:
- the establishment of a community call centre, staffed by over 50 people manning 24 phone lines and running up to 16 hours a day—this centre provide immediate advice to people requiring either information about how to manage without gas or information about their status exempt or not-exempt from the gas restrictions
- the provision of broad scale information to the community about public health issues and safety issues in dealing with food, other putrescible products, hygiene and domestic safety management—this information took the form of public information sheets available on the web and distributed to relevant local agencies, newspaper advertisements and advice and information available through specific officers
- management of a process that on the basis of professional consideration

exempted individuals in need from restrictions on gas use.

Issues in supporting the community

Identifying vulnerable people

In circumstances of restricted resources services need to be directed on a basis of priority. But with little prior understanding of a State-wide utility disruption and less understanding on the range of impacts it was not immediately clear which people, or locations, were at greatest risk.

Need was, to some extent self-identifying when people with special requirements were disproportionate in their enquiries to the community call centre. This self-referral system, supported by Government calls to the public to seek assistance if they required it. It was also allied with the specific professional understanding of different health and community sectors (s uch as aged care, disability, mental health and public health), soon began to identify broad classes of groups in special need.

These groups, in a very crude ascending order of priority, included:
- people whose businesses were shut down or who were laid off from work because gas use for commerce was restricted; principal issues here were about income maintenance and management of gas restoration to minimise loss to the economy
- people who required additional household implements for cooking or heating but could not easily afford them; these included social security recipients
- people who required special heating arrangements such as the frail elderly and new born infants
- people who needed special water heating arrangements for clothes washing (such as infants and the incontinent) or people who needed a supply of hot water for personal bathing (such as people with significant skins disorders or people with psychological conditions that impelled them to bathe many times a day
- people receiving 'hospital in the home services', palliative care or who were on life support systems powered by gas.

All these needs were significant and were addressed in a variety of ways.

The extent of these special needs groups and vulnerabilities became apparent within a short space of time.

Embracing these particular groups was the larger Victorian community that required information about the situation and advice on how to maintain day to day activity without gas.

Parallel, but not counter-balancing the

vulnerable groups, was the bulk of the population, generally in good health, with adequate life management skills to deal with a crisis and with sufficient resources to compensate for the loss of gas (heating, cooking and how water) by resorting to electrical equipment through loan or purchases or with networks that gave them access to resources. For most of these people the loss of gas was an inconvenience.

There is anecdotal evidence—though not corroborated by any systematic study—that the elderly who had weathered the landmark disruptions of war and economic depression or the more personal difficulties of daily domestic life dealt with the stress of life without gas better than the less robust young. As well as being personally more resilient they were more imaginative in the solutions they developed to cope without gas.

Managing the exemption process

Given that some people relied upon gas not for comfort or even convenience but as a life critical health and safety utility ensuring their access to the remaining gas (or to an alternative fuel source) and providing them with support was essential.

The legal and political frameworks surrounding gas were such that specific exemptions were required for people given access to the available gas. Fines had been established for cheating and as well compliance required a transparency to the process to reassure the wide community that, as individuals, they were not being penalised by compliance.

This exemption process was established from scratch and required people with designated medical or health issues to positively seek an exemption by contacting the community call centre and then their need being verified through a nurse or doctor at DHS contacting the person's local general practitioner.

This process worked well, although at times it was cumbersome and time consuming. As the situation progressed and a limited amount of gas became available from New South Wales the exemption criteria were progressively relaxed. Still, exemptions were always provided on the basis of acute medical and health issues.

Managing this process required a large, well managed call centre with over 20 call takers per shift with shifts running from early morning to late in the evening. Calls had to be logged and entered on a database and passed to professional health care worker for contact with the caller's general practitioner.

While this process in itself was not

complex the logistics of managing large numbers of staff, training them, recording data and refining the system in response to changing circumstances required sophisticated management skills, leadership in bringing staff together for a critical purpose.

Coordinating support agencies

Material support was required by many community members including access to community shower, cooking and washing facilities. As well material aid in the form of electric domestic appliances for cooking and heating, as well as blankets, were made available through a number of Statewide non-government organisations (NGOs) to support people who lacked the resources to easily purchase such items.

In addition, information about local circumstances and about how to manage day to day without gas had to be distributed locally. The corollary for this is that locally information had to be gathered, collated and provided to the State Government about local conditions and needs. Existing services, such as Meals on Wheels, were also supplemented to support people in need who were no longer able to cook for themselves.

This required commitment and compliance on the part of the affected municipalities as well as effective coordination by DHS of information flows out from the centre.

This was achieved effectively though using the intermediate government layer of DHS regions, each of which coordinated local government in their own region. The peak municipal body, the Municipal Association of Victoria, also acted as an information channel out to local government and back to Government.

To coordinate NGOs at state level DHS set up a Community Recovery Committee comprised of the major NGOs and relevant Government Agencies. This body developed criteria for providing assistance to people in need and developed equitable processes for delivering that material aid.

This committee also developed and proposed to Government criteria for the distribution of domestic material aid that was jointly funded by the Commonwealth and State Governments.

Managing information

Information management was critical to effective management and coordination of community needs. Public confidence was maintained in part due to the Government's strategy of having only one

peak point of information, the Premier, who provided information that was realistic in its assessment of the time taken to restore gas services and which did not underplay the matter. This strategy of a single authoritative source, which provided information without media spin, helped ensure that the community was informed and helped ensure community cooperation.

Information on practical issues of day to day life management and of maintaining health and safety was distributed through the community call centre, a series for 'fact sheets' prepared by DHS and made available to the media, local government as well as to agencies such as community health centres.

This information was supported by a series of notices in the print media advising about the status of restrictions on the use of gas. Municipalities provided locally relevant information to their constituents.

Advice and information to the health industry was provided through a parallel process situated in an area adjacent to the community call centre. This recorded the status of health and medical centres and coordinated operations to ensure that essential supplies, such as fuel, were distributed efficiently and according to need.

Managing logistics

Managing the detail of establishing a large-scale operation which required the rapid installation and management of information and data management centres necessitated a very considerable logistic effort. The community and health industry call centres were established without prior experience in this sort of event and without the capability of reference to other similar operations in the country.

This management task required a good understanding of community needs and of community reactions to the gas shortage. Initial response depended on the goodwill and commitment of staff and the application of their professional skills and knowledge. For regional and field staff their practical experience, credibility and networks were important attributes they brought to managing community support. This applied particularly in information technology where expertise was required to establish the telephony to manage many hundreds of calls an hour, the development of a local area network to record data on request and exemptions. Other areas requiring particular effort were in scheduling and rostering multiple shifts of staff, briefing

them and monitoring their work as well as ensuring that they were not unduly stressed by the experience. Office management, from acquiring goods, scheduling office supplies and arranging meals was another significant area of work.

At senior level daily DHS Executive briefings and coordination and planning meetings were required, as well as DHS liaison with eth CGRC and the VEMC as well as with agencies such as VENCorp. Media management, and the management of information to the public, which was accurate, timely and not alarming also called upon a range of professional skills.

Lessons

Differential impacts and vulnerabilities

One of the most significant lessons for future crisis and emergency management was that different groups within the community may be affected differentially; they may have different needs which become apparent at different times and these, in turn, require a flexible response.

It was also clear, however, that different groups also possessed different capacities to manage the stress and difficulties of life without gas. These needs and capabilities were not always complementary. The aged, for example, required support for heating but they were also better able to cope with the stress of life without gas than were the young. But their stress management capacity did not reduce their need for heating.

Different parts of the State were affected in different ways, just as different sectors were impacted in particular ways. For example, some people required support because they had been retrenched from businesses that had to close and required income maintenance support. Others needed advice on how to keep their business running using alternative fuels or alternative sources of cooking, heating and cooling.

Resilience and vulnerability

We learnt that some people and households (these people may have belonged to a 'class' of people such as those on life support systems, but they did not belong to a group in so far as a group has strong linkages and communication between its members) were vulnerable in different ways and at different times.

We also learnt that resilience[3] was an attribute that, while not counterbalancing vulnerability, was another personal, household and community attribute relevant to successful management of the crisis. Municipal support to residents

through opening up communal facilities for bathing and washing and cooking was helpful to many people. Municipal distribution of information and local identification of people requiring supplemented or additional services (such as Meals-on-Wheels or Royal District Nursing Service support) were other support mechanisms that were critical in managing the crisis and minimising its impacts.

Local support, either through municipalities, community groups or existing voluntary and not for profit agencies was critical in managing community needs but was not relied upon as a sole strategy.

However, this type and level of local support, and mutual support between community members, were critical elements that we need to develop and incorporate in a more planned fashion into existing, formal arrangements.

State level and State-wide planning

Victoria's emergency management arrangements are in a constant state of learning and review and improvement and have proved effective against a range of events of different scales.

However, these arrangements — and I have no indication that this situation is different anywhere else — do not address the issue of dealing with an event that affects the whole state and, by inclusion, the capacity of emergency management agencies. We had planned for events with the implicit but unacknowledged supposition that there would always be 'somewhere else', somewhere outside the affected area from which we could draw support — material resources, staff, alternative accommodation and the like.

When the whole state was affected there was no 'somewhere else'. So Victoria was essentially thrown upon its own resources[4].

We also learnt that — for community support and disaster recovery at least — that 78 municipal plans and 9 regional plans, event though they cover the entire state and the entire population, do not provide the capacity to manage a State-wide event at State-level. State-level operations for the whole State required supplementary capacities which included; enhanced coordination and command arrangements at state level that applied equally to all parts of Victoria, State-wide information gathering and distributing mechanisms and a robust and adaptive management capacity, supported by appropriate systems and infrastructure, to deal across the State.

This capacity has now been very greatly enhanced in Victoria and is an integral part of the emergency management and community support arrangements.

The role of emergency management

The gas shortage was an event that differed in significant ways from 'traditional' disasters such as floods and bushfires. For instance, there was little physical damage (except for the tragedy at Longford), for most people there was minimal disruption to their lives; there were no defined and short lived periods such as impact, search and rescue, relief operations and so on.

It was debateable therefore whether the emergency management arrangements were the most effective mechanism to use to support the community. This debate continues. At the time supplementary arrangements were developed and applied to deal with the massive scale of the crisis. The emergency management arrangements supported these but were not central to the response. What emergency management did bring to the issue were:
- established databases of agencies, contacts, skills, expertise and capacities
- initial and local mechanisms for coordination
- networks of contacts, liaisons and linkages
- a knowledge of how to deal with crisis, how to pace the use of staff and management arrangements
- a knowledge of how to be innovative, adaptive and imaginative in developing new ways of managing crisis and supporting the community
- networks and systems for engaging the community and local government
- experience in dealing with critical and rapidly changing situations

These skills and knowledge bases were deployed usefully in supporting and informing Government and senior management and in providing a transitional framework for generating a first response and then leading into more sophisticated arrangements specific to the needs of the community.

Managing exemptions

At the start of the crisis there was a blanket ban on the use of gas. This restriction was lifted progressively as two things became clearer. First, that the residual gas in the distribution system would support a very limited number of people for some time given that community compliance with requests not to use gas was (surprisingly) high and was maintained throughout the crisis. Second, that certain people needed gas for heating, hot water or other purposes as a matter of safety and health.

In this circumstance certain categories of people were, on request to the community call centre at DHS and after verification, allowed to use gas. However, there were some complexities with this process. Identifying the classes of people in greatest need and communicating their eligibility to apply took time and had to be handled sensitively. Particularly since many people felt that potentially they had a need for exemption from the restrictions on gas use.

Once they applied DHS doctors and nurses had to discuss their request with their local medical practitioner, recorded (on database specially constructed for the event), communicated to the gas regulatory authority (VENCorp) to ensure that local inspectors did not disconnect the gas manually or charge the people with an offence, and then relayed to the applicant.

The other complex issue, the one above being complex administratively given the volume of requests and their urgency, was to ensure that equity was maintained and that exemptions were provide on the basis of identified and verified need.

This introduced the notion of vulnerability and opened up the whole range of potential needs and requirements for gas. Criteria based on issues of safety and health were used to determine the categories of need eligible for exemption, such as being frail and aged, being on a life support system, receiving palliative care, requiring frequent bathing for physical or mental health (skin disorders and obsessive-compulsive behaviour).

Community engagement and participation

A community support committee was set up after a short period by DHS which included churches, relevant NGOs, and government departments to advise on community needs, effective ways of communicating with the community and to determine methods of distributing material aid (electrical household equipment or vouchers) to people who met certain income criteria.

This process of involving agencies with local networks, credibility in supporting people in need and with experience and

Notes

3. or the capacity to successfully manage the event, to rebound from the loss or even to mitigate the loss potential in the first place

4. Of course had the situation worsened then it is inconceivable that critical support would not have been made available from the other States and Territories and the Federal Government in a willing and urgent manner.

capability if distributing aid was invaluable.

It was clear that Government networks and information channels need to be augmented by those available to NGOs and other local agencies which truly and effectively reach deep into the community and which, at their base level, are staffed and run by people from the community.

Formal networks, systems and arrangements need local, informal arrangements to deal immediately with the needs of the community. Neither can substitute for the other and both need to recognise what value they each bring to community support.

Uncertainty and adaptability

Perhaps the most important lesson we learnt was that uncertainty is a central element of managing disasters and the bigger the event the higher the level of uncertainty. Uncertainty about when 'normal services' will resume, uncertainty about how people are coping, uncertainty about how to deal with wide area events, uncertainty about information — its currency and its completeness.

To deal with uncertainty a high level of adaptability (innovation, creativity and imagination are adjectives that also spring to mind and are relevant) is required to tailor existing systems or to develop new systems to meet the demands of the practical and immediate needs of the community.

Adaptability requires not just innovation and insight but also the courage and boldness to set aside established practices and policies if they are no longer fully pertinent to the situation, which confronts the community.

Conclusion

These lessons are being applied in Victoria at the moment. Learning from the gas shortage is continuing.

The gas shortage only lasted for a few weeks, but recent electricity outages or potential outages have heightened the sense of urgency, which it fomented. These have required management of a scarce resource and effective public information and communication to prevent a 'situation' deepening into a crisis or disaster.

What Victoria now has is an established, tested and robust infrastructure for supporting the community after utility disruptions; this infrastructure can be applied to any crisis or emergency. This infrastructure is supported by administrative and political decision-making arrangements at a very senior level.

These, and the wider emergency management arrangements, are constantly being reviewed in the light of operational experience.

This high level of activity and commitment indicates an improved understanding of the range of consequences and the difficulties in managing these if utilities fail or are disrupted. This improved understanding is being manifested in the development of standardised exemption criteria for a range of utility disruption scenarios as well as by the development of specific management and communication arrangements for a range of other utility disruptions.

An area in which I am especially interested, social system vulnerability and resilience, is also progressing on a number of fronts being supported in various ways by DHS, Emergency Management Australia and the Risk and Community safety Research Initiative at RMIT University.

Note
This paper was presented to the Emergencies 2001 Conference, *Strategies for effectively managing your preparation, response and recovery*, Sydney, May 3.

Conference Announcement

Preliminary announcement

'Community Safety and Sustainability in the Pacific'

International Conference
6th–7th May, 2003

11th Pacific Regional Disaster Management Meeting
8th–9th May, 2003
Nadi, Fiji Islands

Further details including venue and call for papers for the International Conference will be made available in early 2002.

For more information check SOPAC's website

www.sopac.org

Wildfire risk management

Introduction

Where society (or an organisation) perceives unplanned fires as harmful, its objective is presumably to minimise their damage (Hatch and Jarrett 1985). Fire services have traditionally been assigned this role but their approaches vary. Most focus on the inputs, e.g. providing the best service delivery standards or the most efficient resource allocation (e.g. Sakrzewski 1993; Hearn 1993). In these cases, damage minimisation is an assumed or a hoped-for outcome, ie. an implicit goal. Few focus on damage minimisation per se as an explicit goal.

Observation on the conduct of any organisation suggests that the results it delivers are determined by what it focuses upon and what aspects of its performance are measured (ie. what gets measured gets done). Therefore, if a fire service focuses its efforts and resources on damage minimisation as an explicit goal and measures relevant outcome data, damage minimisation should be achieved efficiently. In contrast, the approach of the input focused services may be an inefficient way of achieving the minimum damage outcome.

by Denis O'Bryan, Director,
RED EAGLE: Wildfire Protection Services

Moreover, whether input focused services actually reduce damage is often unclear because the results they report are based on service delivery indicators rather than damage indicators. Their approach may need to be reviewed because there is evidence that excellent service delivery standards are not a guarantee of less damage. For example, the number of serious fires in the UK Fire Service increased by 32% over ten years, despite an excellent record of service delivery (Smith et al 1996).

The purpose of this paper is to describe a wildfire risk management system that explicitly aims to minimise wildfire damage. The principles are also applicable to urban fire management. The system can be applied by an individual land-owner/manager as well as a fire agency. It is consistent with the recommendations of Smith el al (1996) in delivering a balance of both proactive and reactive strategies within a risk management framework.

Approaches to risk management

A fire service typically aims to address the fire problem by applying resources more or less in proportion to a measure of 'risk'. Some studies have found a positive correlation between resource allocation and 'risk' level (e.g. NZ Forest Service— Cooper and Ashley-Jones 1987), whereas others have not (e.g. CFS— Hatch and Jarrett 1985). But the key issue to address is the indicator of 'risk' being used and how relevant it is to the goal of damage minimisation.

Risk is typically understood in terms of likelihood of loss and usually includes identification of what may be harmed and the likelihood of that harm occurring (Salter 1998). For a fire event, there is a likelihood of the fire occurring and a consequence of the fire. *Table 1* summarises the inputs used currently or recently by a selection of fire services to determine a risk classification, and has them grouped into likelihood and consequences.

	Likelihood of fire	Consequences of fire	Suppression aspects	Integrated risk index	Primary uses of risk index
Queensland FS – urban and rural Sakrzewski (1993) (=Britain's system)	A measure used, but not specified	Potential damage	Spread potential	Six risk classes	Allocation of resources
NSWFB – urban Hearn (1993)	Population density, occupancy type	Size of building, installed fire protection (= potential damage)	Travel time	Three hazard classes	Allocation of resources
CFA – urban and rural O E S C (2001)	Population density	Potential damage		Five hazard classes	Allocation of resources
ACT – rural ACT RFS (1991)	Index based on recent statistics	Index of fire behaviour	Index of urgency of control	Five classes of fire hazard index	Planning protection programs, allocation of resources
NZ – rural NRFA NZ (1991)	Climatic zones index	Fuel flammability index, Potential damage index		Five fire danger classes	Allocation of resources
CALM – rural, forest CALM (1993)	Statistics	Potential damage – 7 classes	Response and line construction rate, chance of suppression as indicated by fire behaviour	No	Performance indicators, guideline for planning
PREPLAN –rural Good and Bond (1985)	Seasonal weather data	Fire behaviour to indicate relative damage		Fire behaviour indicators	To identify where fuel load is high and suppression difficult
Spain – rural Salas and Chuvieco (1994)	Index of human activity	Index of fuel flammability, index of fire behaviour		Four risk categories	For fuel management and fire suppression

Table 1: Risk Classifications (in current or recent use).

Table 1 shows that the inputs are quite different between Services, some are derived from historical data and some are arbitrary indices. The indices each have strengths and weaknesses and they are each used to achieve the purposes of each organisation.

But the measures do have some features in common. They assume that if a fire occurs, it will result in maximum damage. They don't take probable fire intensity into account. They don't take design capacity of the fire service into account. They do not specify the link between risk classification and damage reduction.

It is arguable whether some of the inputs or even the integrated risk indices are relevant to risk of fire or risk of damage. Their method of integration is also questionable.

The approach of these fire services can be characterised as follows:
- there is a fire problem that causes damage/concern/inconvenience to constituents, therefore a fire service is required
- assign resources within budget to contain the threat
- assess the fire hazard/risk in some way
- re-assign resources in proportion to the hazard/risk measure
- therefore damage/loss will be addressed equitably in all areas
- therefore the fire service provides the best level of service and investment in it is justified.

Risk of damage approach
This paper presents an approach aimed explicitly at minimising fire damage. It is based on the following hypothesis:
Damage is minimised when risk of damage is minimised.
Risk of damage is minimised:
• by minimising likelihood of damaging fire (= risk of fire incidence)
• by minimising consequences of a damaging fire (= risk of fire damage)

This approach can be characterised as follows:
- There is a fire problem that causes damage/concern/inconvenience to constituents, therefore a fire service is required.
- Its purpose is to minimise damage, etc, within its budget.
- How to minimise damage?
  - by minimising risk of damage
- How to minimise risk of damage?
  - minimise risk in each core component
- How?
  - develop meaningful indicators for

these components of risk of damage
- implement strategies to reduce risk of damage of components
- monitor the outcomes of actions
- report results to constituents in output terms—e.g. damage prevented, damage caused, costs.

The hypothesis is practical because it says that level of damage can always be minimised, because something can always be done to reduce risk of damage. For example, protection infrastructure in the right location can reduce damage from even a severe fire, or, even when a fire is temporarily beyond the capacity of fire fighting resources on a 'blow up' day, something useful can still be done to minimise risk of damage (e.g. assets protected, suppression in safety along flanks).

This hypothesis relies on three requirements for its application to be successful:
- expenditure and effort is on protection and suppression measures that focus on reducing risk of damage
- a fire service is to be fully prepared for serious fire activity each year—it is good risk management practice to prepare for the worst. It is poor practice to base future planning on historical data (Smith et al 1996). For example, rural Victoria should be prepared to deal with at least 2-4 severe fire weather days per month during each fire season (O'Bryan 1993), irrespective an area's recent fire history.
- risk of damage of a whole region will be at an acceptable level when risk of damage of individual property parcels is reduced to acceptable levels — to reduce risk of damage on a property to an acceptable level depends on the landowner's/fire manager's perception of what is acceptable to both themselves and to the community.

For example, if the owner believes that risk of loss is too high, its risk of damage will have to be reduced to an acceptable level. On the other hand, if the owner is satisfied with risk of loss on the property, but the local community regards it as too high, a fire officer may need to intervene. When this acceptability process is repeated for each property parcel, the risk of damage for the whole area is therefore reduced to an acceptable level.

Risk of damage and its components

Likelihood
Risk of fire incidence uses quantifiable historical data about fire occurrence. It includes number, location and type of fire and its causes. Examples include:
- number of house fires per 1,000 houses per year

- percentage of serious house fires per 10,000 ha per year
- number of plantation fires per 100,000 ha per year
- percentage of grass fires caused by equipment

These figures are not used to predict future occurrences, of course, because future fire incidence is a random event. Instead they are used to identify problem issues and to monitor results of prevention activities.

Consequences
Risk of fire damage is indicated quantitatively by Byram's fire line intensity (Byram 1959). The three key components of risk of fire damage are actual fire intensity, vulnerability of the asset or value and chance of successful suppression. Each is manageable to some extent and each is a function of Byram's fire line intensity.

Actual fire intensity: is determined by fuel, weather and topography and expressed as kW/m. It indicates potential damage at a specific intensity

Vulnerability: more damage is expected as fire intensity increases. This trend applies more to a broad area with many assets, and may not always apply proportionately to an individual asset (e.g. a 1000 ha wheat crop burnt by a 20,000 kw/m fire sustains the same loss as in a 50,000kw/m fire).

Suppression: as fire intensity increases, fire suppression difficulty increases, or restated, the chance of preventing damage by suppression decreases.

Looking at the risk of damage approach in another way, risk of damage is reduced when both risk of fire incidence and risk of fire damage are reduced. Risk of fire damage is reduced by firstly attempting to reduce the wildfire intensity level and then to decrease the vulnerability of the asset (both externally and internally) and finally, as extra 'insurance', to improve the chance of successful suppression.

It follows therefore that to minimise level of damage over the lifetime of an asset, minimise risk of fire damage and risk of fire incidence each year.

Wildfire risk management system
The following wildfire risk management system uses objective and quantifiable measures of risk of damage, requires practical and cost effective strategies to be implemented to reduce risk to acceptable levels and monitors results using objective criteria to measure impact of strategies.

It employs a number of sequential steps

to achieve its aim of minimising damage, which have been embedded in the framework of the Australia/New Zealand Risk Management Standard (AS/NZS 4360: 1995) (Smith et al 1996, Salter 1998):
- Establish the context
- Identify risks
- Analyse risks
- Assess and prioritise risks
- Treat risks
- Monitor and review

Establish context and identify the risks

The context refers to:
- risk of damage or loss by wildfire to the land parcel or to the local community
- the respective responsibilities and capabilities of the landowner, land manager, fire agency.

Risk is identified and quantified as gross damage caused by wildfire, either by flame effects or spotting.

Analyse, assess and prioritise risks

Assess potential damage

Evaluate the maximum damage expected when a severe wildfire occurs. For rural fires, damage to commercial assets can be estimated e.g. a crop or a plantation, and damage to non-commercial values can also be given a relative valuation. They can be documented and mapped.

For urban fires, record an estimate of standing valuation of each premises and its contents (or at least its insured value). Assume that once the fire takes hold, structure and contents will be destroyed by burning or smoke or water damage. These valuations can be documented and mapped.

Assess risk of damage

Byram's fire line intensity is estimated for each site under specified weather conditions, and can be presented on a map as an indicator of risk of fire damage. The fire manager or landowner uses it to determine whether the risk is acceptable or not for the land parcel or asset and is then able to consider strategies for risk reduction.

Risk of fire incidence: examine relevant statistics to identify problem issues and problem areas that can or cannot be reduced or eliminated.

Treat risks

Risk components

Risk of damage is reduced by managing its components, risk of fire damage—the fire intensity factors (likely fire intensity, vulnerability of the asset/value, chance of successful suppression) and the risk of fire incidence.

Likely fire intensity: is a combination of weather, topography and fuels. Consider options available for managing fire intensity. For example, fuels can be manipulated on site; weather and topography issues may be able to be managed by site selection criteria.

Vulnerability: of the asset to external or internal fire damage: Because it is usually impractical to protect an asset against a major wildfire, select a maximum fire intensity to be protected against (= design fire intensity — see *Table 2*). Ascertain what works are required, firstly to reduce adjacent fire intensity to this level and secondly, to reduce the item's vulnerability to an acceptable level. These asset protection works become part of the Fire Management Plan.

Take into account the two components of a wildfire that can cause damage, flame and spotting. Both are related to fire intensity but require different protection strategies. Consider whether the damage is permanent or temporary.

The higher the chance of successful suppression, the better the chance of least damage.

Response issues: fire response plans determine appropriate benchmark standards of fire cover, e.g. initial response times and crew strength, and also reinforcement arrangements.

To achieve these standards requires adequate pre-suppression measures like detection systems, communications, road access, equipment and training.

Facilitate suppression: location, quantity, quality of features to assist fire fighters, e.g. water supply, accessibility around perimeter and within, fire suppression infrastructure.

Limit damage: use strategic fire protection infrastructure to limit damage, e.g. fire breaks and fuel reduced zones in rural areas, design features in buildings.

Risk of fire incidence: data enables problem areas and problem causes to be identified and addressed with expenditure on prevention issues, e.g. fire publicity campaigns, enforcement/legislation, isolation strategies. It is used to help evaluate cost effectiveness of proposed risk mitigation measures, but care is needed to resist using historical data to predict the future.

Action plans to reduce risk levels

There are two categories of plans that are aimed at reducing risk of fire incidence and risk of damage levels.
- Fire management plans: deal with expenditure and effort in the prevention and pre suppression areas and with

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Design fire intensity

It is unrealistic to plan to protect against the worst-case fire intensity. For an asset to survive direct exposure to wildfire intensities of 100,000 kW / m (as occurred in the Ash Wednesday fires) or at FDI's (Fire Danger Index) in the extreme zone (50–100) would probably require inordinate expense. Obviously the landowner / fire manager needs to balance the value of the asset and the cost of protecting it against the likelihood of a major fire occurring.

A useful planning tool is to determine an upper FDI or an upper intensity that an asset will be designed to withstand.

It is also wise practice for a fire service to identify its peak suppression capacity (Chandler et al, 1983).

Table 2: Design fire intensity.

procedures in the suppression and recovery areas.
- Fire response plans: are concerned with standby and call out procedures in the event of an incident.

Effective plans are costed and funded.

Menu of strategies for treatment of risk
- **Reduce the likelihood of the risk**
  - reduce local fire incidence
  - locate in low risk zones
  - change in land management use

- **Reduce the damaging consequences of the risk**
  - vulnerability of the asset itself (external, internal)
  - fuel management of surrounding area
  - pre-suppression measures
    - detection arrangements
    - training and skill of relevant personnel
    - location and adequacy of fire fighting infrastructure
    - location and adequacy of suppression forces
    - access to, through and around perimeter

- **Avoid the risk**
  - dispersed locations
  - re-location

- **Share the risk**
  - pacts between groups of landowners
  - agreements with fire agencies

- **Transfer the risk**
  - insurance cover

- **Accept the risk**
  - nothing more can be done
  - the extra cost of protection is not worth the expected loss

Balancing likelihood and consequences

An acceptable level of damage is achieved when the owner/manager is confident that the chance of damage is low and the net damage can be tolerated if it occurs.

First priority is to minimise potential damage up to the design intensity by reducing vulnerability and increasing chance of suppression success. Also consider other risk reduction strategies (above). Then, using fire incidence figures to assess the chance of any fire occurring on site, or a major fire occurring on site, determine the chance of a fire incident over lifetime of your asset.

Acceptable level of damage varies between land owners/managers

The starting point for effective wildfire risk management is to determine what level of damage is acceptable and what expenditure is required to reduce damage to this level. These issues apply equally to fire authorities and landowners, although each is concerned with different types of damage. The fire authority aims to meet public expectation of minimising gross damage or loss (including interruption to their lives or commerce) because fire is seen as a dangerous or unwanted event. The public expects the authority to spend public money in proportion to the risk of damage or loss. Therefore, we observe one off grants being spent to reduce a perceived high risk or on going expenditure to maintain risk at a low level. The landowner seeks to minimise net damage (gross damage less recoverables) to his/her property interests. This is done by on site physical measures and insurance cover but also includes an expectation of support from the fire authority.

Acceptable level of damage varies between fire managers and landowners and also between landowners. Level of risk tolerance also varies from the perspective of the manager. The three attitudes to risk are risk avoider or minimiser, risk neutral, risk taker (gambler) (Blattenberger et al 1984). If they each live on adjacent properties, they will probably adopt different risk management strategies to achieve their own acceptable level of damage. Nevertheless, when each property is at an acceptable level, the risk level of the whole is acceptable (provided neighborhood issues are resolved).

Economic approach

The 'least cost plus net loss' model deals with the balance between protection expenditure, suppression costs and net damage (Mills and Bratten 1982). The theory states that as protection expenditure

is increased, suppression costs and net damage decrease at a decreasing rate (Cooper and Ashley-Jones 1987). The optimal level of expenditure occurs when sum of costs and net damage is minimised.

Whilst this model cannot be applied in annual budgeting, a variation of it can be used to examine the balance between expenditure and risk reduction strategies selected.

To calculate total costs, add annual protection costs and insurance costs to an estimate of suppression costs should a fire occur. The estimate of suppression costs is an annualised figure based on probable size and occurrence (the factor used could vary with the risk attitude of the owner/manager).

To calculate net loss, subtract the following items from the gross valuation: valuation of the undamaged portion and salvage value (according to probability scenario) and insurance payout. Add total costs and net loss for different scenarios.

These calculations can be done annually or for a ten year period or longer to determine the most economic combination.

'Blow up' Seasons

An unfortunate fact of life for rural fires is that over 90% of damage is caused by less than 10% of fires (Chandler et al 1983). Whilst the best fire management plans, the best design fire intensity logic and the best economics based model can work well for 'normal' seasons, they cannot account for 'blow up' years when fire activity exceeds the design limit of the organisation. For example, the Tennessee Valley study found that increasing levels of protection expenditure were associated with decreasing area burnt in normal years, but no relationship in 'blow up' years (Chandler et al 1983). Similarly, in other studies where each annual protection budget was similar to the previous year, 'blow up' seasons resulted in much higher suppression costs and damage, out of all proportion to the budget (O'Bryan 1993).

How can a fire service minimise damage in these seasons?

By continuing to apply the strategies of minimising risk of damage.

Monitor and review

Performance measures

The two performance categories are inputs and outputs. In an organisation, inputs (e.g. staff, budget, resources and activities) are deployed to achieve outputs (e.g. less serious fires, less area burnt,

lower damage, higher levels of public confidence). Input indicators are useful for monitoring the efficiency of fire service activities, e.g. standards of fire cover. Output indicators are used to measure the results of an organisation's efforts. They are often more difficult to measure, but are essential if achievement of results is the goal.

The following output indicators might be meaningful.

In the rural environment:
- number of fires per 100,000 ha per year
- area burnt per 100,000 ha per year
- damage ($) per standing value per year

In the urban environment:
- number of premises fires per 10,000 premises per year (categorised by city, suburb or region)
- gross damage per 10,000 premises per year
- gross damage per standing value per year

The relevant principle is: what gets measured can be improved. If the right performance indicators are used, impacts of changes in expenditure patterns or policy can be monitored. Furthermore, they can be used to justify or explain policies of policy changes to a dubious audience. Finally, they can be used as objective measures for performance appraisal.

Monitoring and on-going review

If the goal of a fire service is to reduce damage, and its performance is measured with indicators of damage, the organisation would seem to have a high level of accountability and a very high chance of achieving its goals.

When level of protection expenditure is examined against net damage over a 5 or 10 year period, question whether damage level and costs of suppression are acceptable. If yes, an equilibrium may have been reached. If not, examine where protection money is spent and weed out expenditure that will not result in damage reduction. Alternatively, an increase in protection expenditure may be required.

Caution: When comparing risk levels and protection expenditure in different districts, anomalies can be found (e.g. Robertson 1989, O'Bryan 1993). If district A has low protection costs and high damage levels, and district B has high protection costs and low damage levels, an apparently logical conclusion is to spend more where risk is highest, ie. take money from B and give to A. Resist this conclusion because an equilibrium may be operating in B or abnormal annual figures may skew the averages.

Examples of monitoring

This selection of examples shows the usefulness of good monitoring procedures and the ineffectiveness of poor monitoring.

- Cheney (1993) audited the fire management activities of the Tasmanian Forestry Commission. The performance indicators used were fire numbers, area burnt, cost of suppression and fire damage estimates. It found a significant increase in fire suppression costs, variability in area burnt and also in assessed damage. The study fell short because neither fire protection costs nor areas of fuel reduction were included.
- O'Bryan (1993) examined fire protection performance on public land in Victoria. The studies used area burnt to estimate damage because fire damage valuations had not been kept. In one study of an 18 year period (when protection expenditure kept pace with inflation), cost of suppression increased substantially (including cost per fire and cost per ha burnt) and total area burned in 'normal' fire seasons remained unchanged. A study of four decades found a steady increase in number of fires, variability in average area burnt and a slight reduction in average number of large fires.
- Hanson and Rowdabaugh (1989) monitored the effect of a change in fire policy in Alaska, in particular, the effect on fire suppression costs and area burnt in a limited action zone (areas of low value where fire is monitored rather than attacked). They found that expenditure in quiet fire seasons saved suppression costs but in severe seasons incurred higher expenditure and larger areas burned than if fires had been attacked on day one.
- In the Maniwaki region of Canada, the average fire size in the 1960's was 60 ha. After investing approx $500,000 on protection measures (prediction, detection and first attack) during the 1980's, the average fire size was 1.4 ha and this translated to a saving of $1 M of wood damage annually (Sibbald 1990).
- For many years, the fire suppression policy of the US Department of Agriculture was basically to control the fire by 10 am next day. In the 1970's, a US Senate Committee concluded that protection costs 'have risen dramatically in recent years but the Committee is unable to discern any marked benefits stemming from these expenditures'. In 1978, the USDA changed policy to require that the fire management

program to be 'cost effective and become a part of integrated land management' and in 1981 included the criteria of 'economic efficiency and probability of success' as part of fire suppression decision making (Mills and Bratten 1982).

- UK Fire Service inquiry found that the number of fires had increased by 20% in the previous 10 years and the no of serious fires by 32%, despite an excellent service delivery record and significant expenditure. It also found that the fire service brigades were being funded in proportion to the number of incidents attended. This was causing wastage of resources and provided no incentive for incident prevention. It was recommended that the basis of funding be changed to provide strong incentives for incident prevention within the community. (Smith et al (1996) were advocating a broader risk management approach and the need to break the incident driven self-reinforcing cycle: incident occurs > need for response > need for investment for greater response efficiency.)
- Up until 1969, the average annual expenditure on fire protection in the British Forestry Commission was ten times the value of average losses. Expenditure was then slashed to almost one tenth and during the 1970's, annual losses increased substantially but the total of costs plus losses remained similar (Teasdale 1981).

Summary

A wildfire risk management system is outlined that is explicitly targeted at minimising damage. Damage minimisation is the expected outcome because the system focuses on reducing risk of damage to acceptable levels.

The system's on going effectiveness relies on monitoring and reporting performance data that includes meaningful damage indicators.

It is applicable for a fire authority, an organisation or for an individual landowner. It can be applied to rural and urban landscapes and to either individual properties or regional areas.

Definitions

Assets in this paper include items that have economic value or non-tangible resources or values that have an emotional or non-economic value to the community or to a person.

Damage refers to the problems caused by wildfires. It is typically measured as gross or net dollar valuation, but can also refer to the consequences of wildfire

(economic losses, hardship, inconvenience, anxiety). It can also refer to the perception of damage.

Fire prevention is aimed at reducing the number of fires occurring. It includes actions such as fire publicity campaigns, enforcement patrols, legislative changes.

Hazard refers to the fuel components, e.g. fuel type, flammability, quantity.

Pre suppression is concerned with improving fire suppression effectiveness. It includes issues such as detection, communications, road access, fire fighting infrastructure, equipment, training and fuel management.

Protection in this paper is a collective term for prevention, pre suppression and asset protection works.

Risk of damage is a measure of the degree of damage caused by wildfire.

Suppression is the activity required to extinguish the fire.

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About the author

Denis has specialised for many years in wildfire protection, from the operational to the planning and policy areas, and also in training. He has worked in the two fire agencies in Victoria that deal with wildfires on both public and private land, and has had solid experience in both local and statewide roles.

He has a good understanding of wildfire risk and has developed a unique approach to its assessment and management using GIS to full effect. He is now director of Red Eagle, which provides a range of fire protection services, including this GIS application.

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This article has been refereed

Book Review

A Guide to Business Continuity Management (2000)

by Brian Doswell

Published by Perpetuity Press Ltd, UK
64pp, ISBN 1 899287 57 4

Reviewed by Peter Woodgate
RMIT University

All too frequently your smoothly running organisation can unintentionally overlook the need to review its business continuity planning. Or maybe you are a recent start-up that is consumed by the need to grow the market and continue your innovative developments. Perhaps you simply lack the experience to know how to systematically tackle the task. Whatever the reason recent world events in recent months have clearly thrown the spotlight back onto this important issue.

Fortunately for us 'A Guide to Business Continuity Management' comprehensively covers the topic.

It is a concise, no nonsense, summary of the key elements of business continuity planning. Its table of contents alone acts as a full checklist of topics for the concerned manager; risk evaluation, impact analysis, strategy development, emergency response, development and implementation, awareness and training, public relations and coordination with public bodies. It even covers the need to regularly exercise the plan through rehearsals that include all critical third parties

The book has all the feel of a work penned from hard won experience. Its examples are mainly cited from the UK although it does have prescient references to the World Trade Centre and separately, a comment on the risk of 747's crashing into buildings. Its glossary of terms underlines its value a good working text.

Those wishing to obtain an encyclopaedic coverage of the topic should look elsewhere. As the author notes, the Business Continuity Institute in the UK and the Disaster Recovery Institute International in the US represent two of the definitive organisations of excellence for this discipline.

With its 64 well spaced A5 sized pages it makes quick reading. Costing the equivalent of about AUS$65 it comes at a premium price in Australia but is undoubtedly a useful reference to have particularly if your library is currently light-on for texts on business continuity.

Price
£19.95 (plus £1.50 p&p in the UK or £3.50 p&p elsewhere)
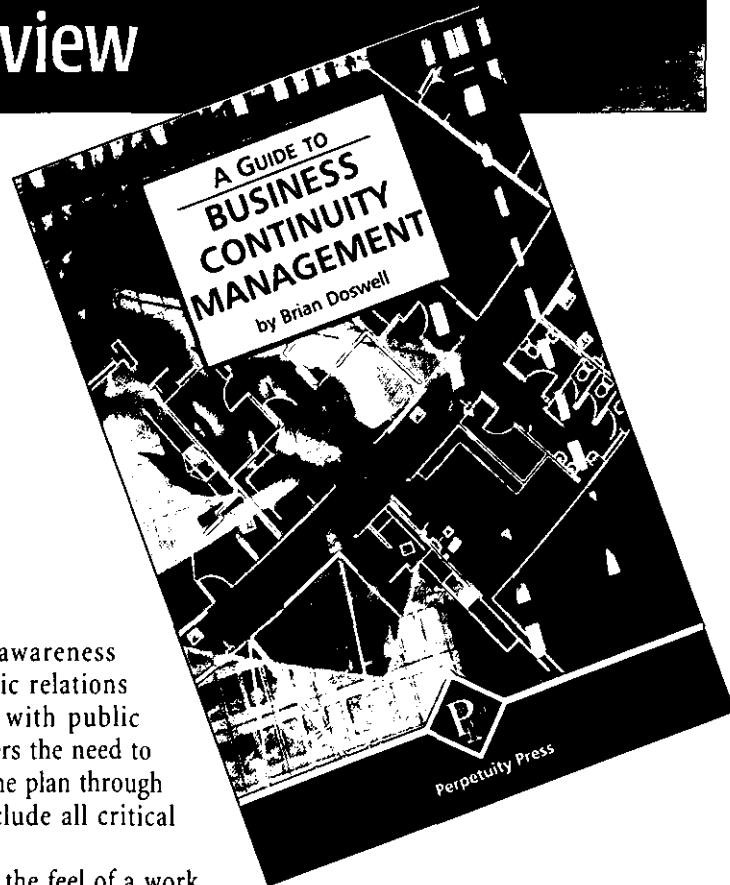
Are disaster management concepts relevant in developing countries?

The case of the 1999-2000 Mozambican floods

Introduction

Disaster management has evolved somewhat over the past few decades with a shift from response to prevention and preparedness. The United Nations International Decade for Natural Disaster Reduction (1990-2000) saw many nations, including Australia, adopt four specific disaster management concepts, namely:
- the All Hazards Approach
- the Comprehensive Approach (incorporating prevention, preparedness, response and recovery)
- the All Agencies Approach
- the Prepared Community

These four concepts formed the framework for data collection in this study, and as the concepts and their application have been widely published by Emergency Management Australia, they are not detailed here.

It is generally accepted that the four concepts must all be satisfied in order for a nation to have an adequate approach to disaster management. A study was undertaken in the Republic of Mozambique after devastating floods, to determine if the 'universal' disaster management principles are as relevant in developing nations as they are in more affluent nations.

Mozambique

The Republic of Mozambique is a mid-

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sized nation located on the south-east coast of Africa, as shown in *Figure 1*.

It has a population of approximately 19,000,000, roughly the same as that of Australia. However, its land area of 800,000 km² gives Mozambique a population density about ten times greater than Australia. The capital city, Maputo, is located on the coast in the extreme south of the nation. Mozambique's population is almost entirely (99.7%) composed of indigenous tribes, such as Shangana, Macua, Macondi and Sena (Geographica 1999).

Mozambique's health and economic standing is among the lowest in the world. This can be primarily attributed to a prolonged drought that started in the early 1980s and a 16-year civil war after their independence from Portugal that ended in 1992. These two calamities severely affected the economy and infrastructure of the nation, and by 1989, Mozambique was the world's poorest country (Geographica 1999).

Mozambican statistics

According to the United Nations Human Development Index, which is calculated from life expectancy, educational attainment and per capita income, Mozambique ranks as the seventh least developed country in the world (Oxfam 1997). Mozambique's social indicators are also among the poorest in the world. *Table 1* shows a selection of Mozambican health indicators, with those of Australia listed for comparison. Data was obtained from World Health Organisation (2000) and United Nations Department of Economic and Social Affairs (1997).

Mozambique is heavily reliant on foreign aid, with 1996 external financing requirements estimated at more than US$2 billion (Oxfam 1997). Between 70% and 80% of the Mozambican Ministry of Health's budget is directly sourced from overseas contributions.

The floods

Meteorological progression

Mozambique had its usual rainy season in 1999 that began in late September. However, in early December, a massive
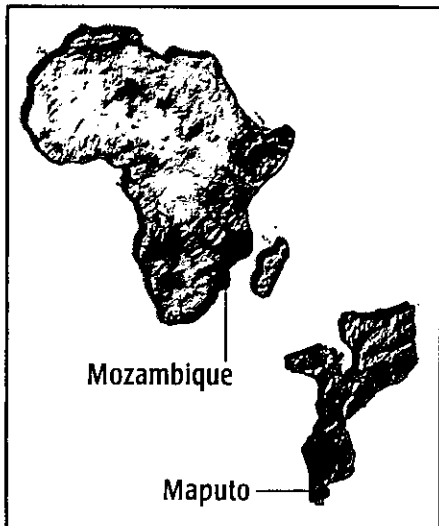
Figure 1: Mozambique.

Indicator	Mozambique	Australia
Access to safe drinking water in urban areas	17%	100%
Access to safe drinking water in rural areas	40%	100%
Male adult literacy	57.7%	Above 90%
Female adult literacy	23.3%	Above 90%
Average male life expectancy	41.8 years	76.8 years
Average female life expectancy	44.0 years	82.2 years
Infant mortality per 1 000 live births	118	10
Maternal mortality per 1 000 live births	15	0.09
Infant mortality of males aged five and under per 1,000 live births	196	7
Infant mortality of females aged five and under per 1,000 live births	189	5

Table 1: Health Indicators for Mozambique.

low pressure system settled over Mozambique, as well as neighbouring South Africa, Swaziland, Zimbabwe and Botswana. This created a wetter-than-average month. On 27 and 28 December 2000, Mozambique experienced unusually torrential rain in the southern region; so much rain fell, in fact, that the National Institute for Meteorology had never recorded such a high rainfall in its near-100 year history. The city of Maputo bore the brunt of the weather, and serious damage to infrastructure was caused.

Over the next two months, a series of tropical depressions continued to produce rain in the central and southern parts of Mozambique, filling rivers and dams to capacity, causing more flooding. In mid-February 2000, an offshore depression evolved into a cyclone, code-named Cyclone Eline, which hit the coast of Mozambique on February 22, and travelled inland. Cyclone Eline deposited huge volumes of water on the already water logged country, causing major flooding. The Umbeluzi and Incomati rivers reached levels not seen since 1937, and the Limpopo River rose to an unprecedented high. The towns of Chókwè and lower Xai-Xai were completely flooded. A map of the path of the cyclone is shown in Figure 2 (United States Agency for International Development 2000).

Cyclone Eline moved inland and hit several other African nations before dispersing. Many populated areas were threatened in these nations, to which the respective governments responded by opening floodgates. This caused a series of literal 'walls-of-water' to flow downstream into neighbouring Mozambique, causing the destruction of several towns and extremely rapid inundation of others. The Limpopo, Save, Búzi, Incomati, Umbeluzi, Pungue, Lucite, Mucune and Mussorize rivers and catchment basins suffered extremely extensive flooding.

Up until March 2000, the southern provinces were the most affected, and although the central part of Mozambique had experienced minor to moderate flooding, this was comparatively less severe than the south. Then, in early April 2000, another large tropical depression intensified, resulting in Cyclone Hudah. This cyclone hit two of the central provinces, causing extensive coastal flooding. The sheer size of Cyclone Hudah is shown in Figure 3, a satellite image from the US National Oceanic and Atmospheric Administration.

After inundating the central provinces, Cyclone Hudah was downgraded to a tropical depression, where it moved south
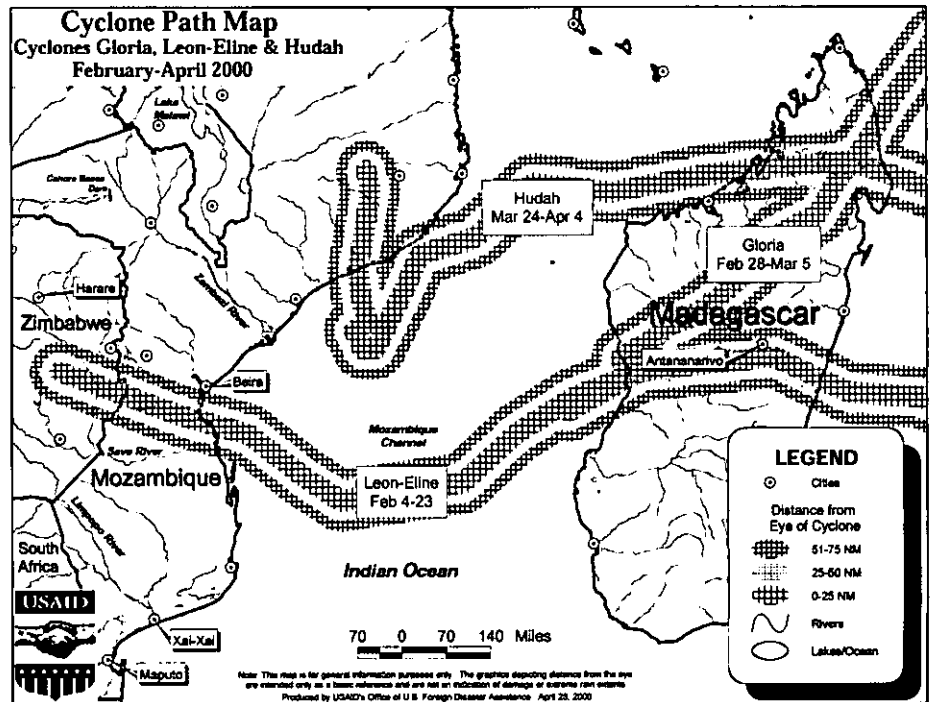
Figure 2: Path of Cyclones Eline, Hudah and Gloria. Source: United States Agency for International Development.
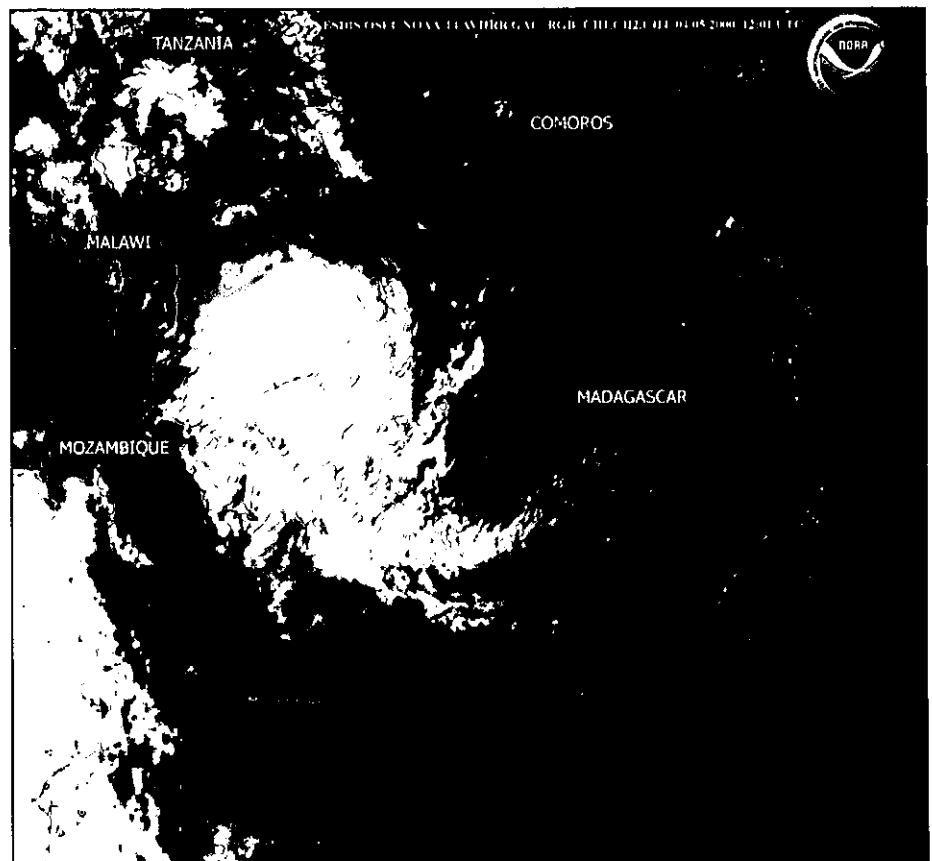
Figure 3: Cyclone Hudah crossing the Mozambican coast. Source: US National Oceanic and Atmospheric Administration

and caused still more rain to fall. Such a volume of rain fell that the ground became completely water logged. Areas of Maputo city were seen to be still inundated in early August, when the data collection for this study was carried out. From mid-April to August, isolated showers occurred throughout Mozambique, which did not cause further flooding per se, but delayed the natural drainage of the floodwaters.

The impact

There are widely differing estimates of the size of the affected population and the number of fatalities attributable to the floods. All the nation's physical and human resources were aimed at rescue and relief, and accurate records were not kept. Indeed, if resources had been used instead for surveillance and record keeping, the affected population may have been greater.
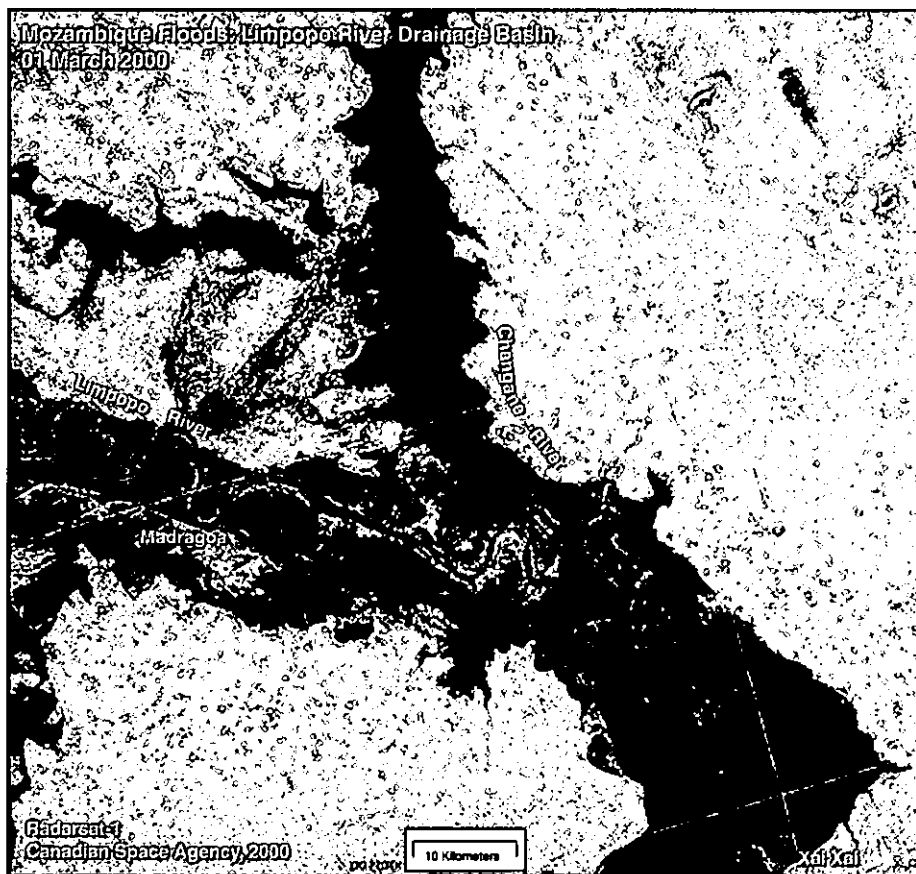
Figure 4: Satellite Image of the Limpopo River and Xai-Xai.   Source: Canadian Space Agency.

Also, due to Mozambique's recent wars, the country's total population is not known accurately. Probably the most accurate estimates are the figures presented at an international appeal for disaster funding held in Rome, Italy.

The figures were calculated from estimates obtained from national, provincial, local and foreign governments, United Nations agencies and non-government organisations. It was reported that there were 699 deaths, 95 missing persons and an affected population of 4,517,432. However, these figures were dated 21 March 2000, which was before Cyclone Hudah struck. Therefore, it is reasonable to conclude that the figures are most probably underestimates. In fact, these estimates do not include any figures for the central, coastal provinces of Nampula or Zambézia.

At an international appeal held in Rome, it was reported that 10% of the country's cultivated land and about 100,000 hectares of subsistence and income crops had been destroyed. Approximately 90% of all operational irrigation structures in flooded areas were destroyed. Over 40,000 head of cattle had been reported as missing in April 2000. These losses had major consequences for the rural sector of Mozambique, as the nation is primarily dependant on family agriculture, and trade came to a complete halt in the southern rural sectors.

The protection dykes of several towns were destroyed, resulting in complete inundation. *Figure 4* (Canadian Space Agency 2000) shows the city of Xai-Xai (bottom right) within the floodplain of the Limpopo river. Normally, river systems would show as thin black lines on a satellite image such as this, however the image shows the rivers as several hundred times wider than usual.

Chókwè was completely inundated twice as a result of a neighbouring country opening the flood gates of its dams. Extensive structural damage was caused both by the by the flood waters, and the mud and silt that was left behind.

A preliminary assessment of the economic impact of the floods was prepared by the World Bank before cyclone Hudah had formed.

This assessment was also presented at the international appeal in Rome, which calculated a total loss of US$599,000,000 detailed as follows (Mozambique: Post-Emergency Reconstruction Program 2000):

• lost assets and direct costs, US$273,000,000
• lost production and indirect losses, US$247,000,000
• reduction in exports, US$48,000,000
• increased imports for consumption, US$31,000,000.

These figures are estimates of the losses due to the floods and do not include any estimates for the cost of reconstruction.

The project

Research for this project was undertaken in July and August 2000, which was at the end stages of the floods. However, there were still areas inundated and people in temporary accommodation centres at that time.

An office was provided within the 'Emergency Technical Coordination and Information Unit' within the Mozambican Ministry of Health, which was where all documents and computer files relating to the floods were kept. This allowed easy access to the many documents, files, graphs, maps and satellite images from the floods, of which a thorough review was undertaken. The Ministry of Health provided any additional information requested by the researcher. Access was also gained to the Department of Environmental Health's library, where a wide variety of government policies and manuals are housed.

Supplementary to this, interviews with several key stakeholders in disaster management and the floods were facilitated, and included senior employees and managers from the Mozambique Government, United Nations agencies, non-government organisations and foreign government aid agencies. The interviewees were asked questions about disaster management in general, with the floods being used as an example.

A large accommodation centre on the outskirts of Maputo city was visited. The camp still housed approximately 300 displaced people awaiting transfers to resettlement camps, months after the deluge from the cyclones occurred. The conditions were very basic, with a lack of food and transmission of air-borne diseases being the main concerns in the camps. Various flood damaged areas around Maputo Province were also visited.

Results

Due to the many types of data collected, a holistic view of disaster management in Mozambique was gained. All the data were integrated, and critiqued using the four disaster management principles. These are detailed individually below.

The All Hazards Approach

For the All Hazards Approach to be followed, an all-encompassing written disaster management plan is preferable as it can stipulate the scope of the plan, and identify actions that are common to all disasters. It is not essential to have a disaster management plan, although some form of disaster planning must be undertaken. This can be formal or

informal, written, spoken or implied. In the Mozambican context, very little evidence of formal planning was located. The government, as well as non-government organisations and United Nations agencies tended to focus most of their money and resources into disaster response rather than preparedness. By doing this, each disaster has been dealt with on a case-by-case basis. By undertaking disaster management in this way, the All Hazards Approach has been largely unachievable.

The publication *Manual de Atenção à Saúde em Situação de Emergência* (Manual of Health Priorities in Emergency Situations 1992, p. 7) takes a rather holistic approach to disaster management planning, and instead of categorising disasters, explains disaster management as applicable to 'emergency situations caused by epidemics or other calamities'. It is important to note that the division of emergency situations into 'epidemics' and 'other calamities' was done because epidemics are so prevalent in Mozambique that they form a large proportion of disaster situations, not because they are seen as needing differing responses. This document would make a good basis for developing a functional disaster management plan, as it's scope is wide enough to encompass most disasters.

The local newspaper *Notícias* ran an article on a National Disaster Managment Institute working group that were devising a national disaster management plan. (Para Casos de Catástrofes: INGC Prepara Planos de Contingência 1 August 2000, p. 1). The group was reported as writing a plan for floods and other natural disasters. This goes against the principles of the All Hazards Approach, in that both natural and human-caused disasters should be covered by the one set of management arrangements.

Although the general response to the floods was adequately managed, the lack of an identifiable disaster management plan affected the other areas of disaster management, such as prevention and preparedness. There was an almost total lack of prevention and preparedness, largely due to the absence of a working document addressing these issues. This style of management was consistent with disaster management before the 1970s, when aid relief was given the highest priority (McEntire 1998). However, disaster management in Mozambique must be put into the context of everyday life. The Central Government relies on international donations to fund many of its non-disaster activities, so planning for future disasters cannot be given the

highest priority while more immediate concerns are present.

The interviewee from the United Nations Children's Fund (UNICEF) stated that although most organisations and government departments worked well during this disaster, there needed to be a plan with a chain-of-command and clearly defined roles for relevant stakeholders. This was in the event that future disasters did not invoke the same level of solidarity and mutual cooperation as that experienced in the floods.

Almost all of the documents collected specifically related to the floods, and stated this explicitly. This was probably due to the sheer extent of the flooding. The floods were such a devastating occurrence that the government devoted a large proportion of its resources to disaster management of the floods. While planning documents and contingency plans should not be disaster-specific, disaster reports and working documents used throughout the disaster *need* to be specific in order to explain the extent of the disaster and to best utilise available resources. Although most of the documents collected were disaster-specific, they were working documents to be used exclusively during the floods and for no other emergency situation, and therefore did not go against the principles of the All Hazards Approach.

The Comprehensive Approach

Prevention
The Ministry of Health working document *Minimum Requirements for the Safe Return of Affected Populations* (2000), which was developed in collaboration with the Ministry of Environmental Coordination, Ministry of Public Works and Housing, World Health Organisation and UNICEF, states that because of the floods, the most vulnerable of the population need to be moved to an area with less risk of flooding. Minimum requirements for these new areas were also detailed.

This is corroborated in an interview with a Ministry of Health employee, who stated that the government is helping those in accommodation centres in Maputo city to resettle into less flood-prone areas. This is being performed by trading the displaced person's old land for new land in a less vulnerable area, and providing them with building materials and pre-fabricated building kits. The rationale behind the government-sponsored moves is that disasters on the scale of the 1999–2000 floods, although not occurring often, are an ever present danger to low-lying Mozambique, and by making people less vulnerable to floods now, the extent of the

'human factor' will be reduced in the future. However, it was not possible to ascertain whether the community had input into the planning of the resettlement process. It is important that the government ensures that the relocated populations still have access to fertile land and sources of fish, or relocation may be removing one problem while creating another, especially in a nation so dependant on family agriculture.

A widespread vaccination program was implemented in the southern and central provinces. A report titled *Programa Alargado de Vacinação: Relatório Sobre a Vacinação de Emergência* (Enlarged Vaccination Program: Report of Vaccination in the Emergency 2000) reported that vaccines for meningitis, measles, tetanus and vitamin A deficiency were all made freely available to those in disaster management temporary camps. Although this is not considered to be prevention of the current disaster, it is prevention of possible supplementary complications that may occur as a result of the floods.

Some non-government organisations have a permanent presence in Mozambique. Their day-to-day activities include poverty alleviation through housing programs. This reduces the vulnerability of those being resettled to floods, and could be considered a prevention strategy. However, in a cable document titled *United States Government Response Framework for Flooding in Central and Southern Mozambique* (2000), in which various programs are detailed, the section on resettlement explains how The United States Agency for International Development will 'move affected people back to their homes as soon as possible and support their initial reintegration into flood-devastated areas'. For many people, resettlement into the same flood ravaged areas will mean they will be largely affected by any future floods. Although the idea of trying to return the population to conditions of normality as soon as possible is commendable, it would be desirable for the government to follow the All Hazards Approach, and in relocating people to less flood-prone areas, must not expose those moving to increased potential for other disasters, such as fires, landslides and droughts.

Preparedness
From the data collected, there was seen to be only one preparedness-type activity undertaken in Mozambique.

The Ministry of Health epidemiology department alerted the provinces of possible flooding when Maputo Province began to become inundated. A national register of medicines was compiled by the same department. This preparedness measure was identified by both UNICEF and Ministry of Health interviews, as well as the National Disaster Management Institute situation reports.

In the introduction to *Manual de Atenção à Saúde em Situação de Emergência* (Manual of Health Priorities in Emergency Situations 1992), it is stated that '[the manual] should be studied **before** there is a problem' (translation, original emphasis). In contrast to this statement, not one interviewee identified this publication as providing any direction or reported that it was used.

There were two disease outbreak manuals obtained from the Emergency Technical Coordination and Information Unit (*Unidade de Coordenação e Informação Téchnica de Emergência*—UCITE) headquarters that had small amounts of information about preparedness for the specific disease outbreaks. *Manual de Prevenção e Tratamento da Cólera* (Manual of Prevention and Treatment of Cholera 1993) had a section on activities that needed to be undertaken during an epidemic, as did to a lesser extent *Manual Para o Controle e Tratamento da Meningite Meningocócica* (Manual for the Control and Treatment of Meningococcal Meningitis 1997). These two publications were distributed to interested stakeholders, and may have lessened the burden of the disaster. Cholera was a problem during the floods being a water-borne disease, however it is endemic to almost all of Mozambique, so could not be classified as an epidemic. Meningococcal meningitis spreads in areas where people are in close contact, such as temporary accommodation centres, therefore was a concern during the floods. The statistics compiled for cholera cases during the floods were treated with caution, as there was the possibility that the observed increase of cases was due to an increase in surveillance.

There was no evidence that other preparedness activities were undertaken. The interviewee from UNICEF identified a difficulty in obtaining funding for disaster prevention and preparedness when there is not a national emergency. The interviewee went on to say that a national disaster management unit is needed immediately, and should work on prevention and preparedness when there are no disasters.

Although the cholera and meningococcal meningitis manuals may have been useful, they were not written specifically for disaster situations, and must be interpreted for disasters. Rather than having manuals for the specific diseases, it would be preferable to have a document that stipulated minimum sanitary and health requirements and how these can be achieved in order to prevent or minimise disease outbreaks and epidemics.

There was a notable exception to the disease manuals—malaria. This mosquito-borne diseased is endemic throughout Mozambique, and results in more fatalities than any other disease in Mozambique. There were significantly higher numbers of malaria cases reported during and after the floods, as stagnant water provides an ideal breeding place for mosquitoes. It is not known whether a manual exists for malaria in Mozambique, although a disease outbreak such as this should be covered in a national disaster management plan. As previously explained for cholera, this increase in reported cases may have been due to increased surveillance.

Response

The response to the floods was extensive. The interviewee from the Australian Agency for International Development stated that over 200 non-government organisations were working along with all government ministries on the disaster. Of the four disaster management concepts, and of the four principles of the Comprehensive Approach, the response was the best handled, although still had some deficiencies.

A Ministry of Health employee reported that in the early stages of the flood, all ministries and non-government organisations were working independently. This became a problem as some areas of Mozambique were without aid while others had up to 15 non-government organisations working with them. In response to this, the Ministry of Health required all non-government organisations to register with UCITE and obtain a certificate enabling them to be able to work in Mozambique. This system worked relatively well, and was accepted by the non-government organisations. A further discussion of the certification letters of application required of the non-government organisations is detailed under the All Agencies Approach heading.

All of the larger organisations working on disaster response in Mozambique prepared reports which were usually freely distributed among government ministries and to non-government organisations and United Nations agencies. Reports from Mozambique Red Cross, *Médecins Sans Frontières* (Doctors Without Borders), the United States Agency for International Development, UNICEF, *Action contre la Faim* (Action Against Hunger), Oxfam Great Britain, Japan Disaster Relief Medical Team and World Health Organisation were obtained from UCITE headquarters. These reports provided a valuable insight into collaborative networks for each organisation and how they undertook relief work.

Oxfam Great Britain was highly critical of the National Disaster Management Institute, especially in coordination activities. The document *Trip Report: Aerial Survey of Save and Búzi Rivers—2 March 2000* (2000, p. 3) stated 'there was a clear feeling that the search-and-rescue effort in the Save/Búzi [catchment basin] is under-equipped, under-managed, and inefficient... rescue assets that exist in the area are being wasted'. An interviewee from the Japan International Development Agency also believed that the National Disaster Managment Institute (*Instituto Nacional de Gestão da Calamidades*—INGC) was not as effective at coordinating as it could have been, and stated 'INGC has a lot of problems and it didn't work well during the floods, we didn't really have anything to do with INGC'. Several comments by the interviewee from UNICEF also re-enforced the notion that the National Disaster Management Institute were not 'on the ground' coordinating the many organisations and agencies that were stakeholders during the floods, but rather undertaking their activities from their central office in Maputo.

With so many non-government organisations and other organisations working on disaster response, a lack of coordination was initially a problem. The interviewee from UNICEF stated that although most of the non-government organisations worked well with the government, there were some 'pirates' [sic], who arrived in Mozambique with no experience or equipment, and expected the government to provide accommodation and food. The Ministry of Health epidemiologist had similar comments and said such people wasted much of the government's time. A member of UCITE stated some non-government organisations expected resources such as helicopters and boats to be made freely available to them.

Médecins Sans Frontières (Doctors Without Borders) in conjunction with the

European Union and *Agence Européenne pour le Développement et la Santé* (European Association for Development and Health) produced a document titled *Consolidated Information System Mozambique: Special Edition 2—Floods* (2000). Included in this document were 56 maps of affected districts with the extent of the flooding shaded and location of health facilities indicated, as well as detailed information on the number of affected people and access to roads and communications. The document was produced free of copyright and widely distributed to interested stakeholders. It provided those working in the field with an up-to-date reference book of the approximate extent of flooding and access to any of the affected districts, thereby greatly reducing time spent by organisations and agencies assessing the areas beforehand. The international response to the floods was admirable. Several countries deployed military and civil groups to help the people of Mozambique.

There was a problem with foreign governments and non-government organisations donating unusable or inappropriate items. At the onset of the floods, UCITE provided all foreign embassies and consulates in Mozambique, as well as all Mozambican embassies overseas with a list of medications and other materials that were needed. This was done to prevent unnecessary items being sent. However, the interviewee from UNICEF stated that nonetheless, a lot of unsuitable medication and other materials were donated, including expired medication. These all had to be disposed of, with some of the more hazardous medications needing to be incinerated. This diverted scarce government resources. Unnecessary aid was still being sorted from useful aid during early-August 2000.

Conditions in the temporary camps were very basic, and according to the report *Rapid Nutritional Assessment of Displaced Children Aged 1-5 Years in Mozambique* (2000) from the Ministry of Health, up to 8% of children in camps were suffering from moderate malnutrition, and up to 83% of those had diarrhoea. One of the largest accommodation centres in the country was located in Maputo and was visited in late July 2000 as part of this study. At the time of the visit, there were still approximately 300 people living in this 'temporary' accommodation, which had housed people since November 1999. The camp was located in an unused factory that had been segregated into sleeping and dining quarters. There was one room used by

Figure 5: Sleeping area for displaced persons, Maputo Province.

Figure 6: Eating area for displaced persons, Maputo Province.

Red Cross as a health post, and pit latrines were dug on the premises. *Figures 5 and 6* show the living conditions in the temporary accommodation centre visited.

The temporary camp visited was reported to be better than several other camps as it had permanent structures to house people. Several camps were settled in a matter of days, caused by rapidly rising water being released from upstream dams. Chókwè is a good example of this, where the Mozambique Red Cross reported that the entire city moved within a week (Mozambique Flood Victims Relief Operation: Gaza Province Health Interventions 2000). A report by the World Health Organisation (Visits of a WHO Team to Sofala 2000) stated that of 20 temporary camps visited, only three had latrines, one had safe drinking water,

two had good sanitation and one had sufficient amounts of food.

A lack of coordination in some areas, especially rural, resulted in temporary camps being set up by the population on the side of roads. These camps had no latrines, health facilities or water supplies, and stretched for several kilometres along the roads. *Figure 7* shows an unplanned temporary camp that was set up by displaced people in Cheaquelane. The Ministry of Health estimated that there were approximately 35,000 affected persons in Cheaquelane, and the temporary camp ran for 6 kilometres along the main road.

Recovery

At the Rome appeal, the Mozambican Government presented a document

Figure 7: Unplanned Roadside Camp, Cheaquelane.

entitled *Mozambique: Post-Emergency Reconstruction Program* (2000) which detailed what the government is planning to do once the response phase is over. The category of recovery is divided into four areas: social sectors, infrastructure, reducing vulnerability and future programmatic prevention measures. It is a detailed document, and explains in depth specifically required actions and the associated costs. The total costing of the reconstruction program is US$449,500,000. However, this figure includes only costs that are needed for recovery activities, mostly restoring infrastructure.

The *Gabinete de Coordenação de Projectos de Investimento* (Cabinet of Coordination of Investment Projects), a working group under the Ministry of Healths *Direcção de Planificação e Cooperação* (Directorate for Planning and Cooperation) published a rather lengthy document titled *Emergency Relief Planning for the Central and Southern Regions of Mozambique* (2000). Part of this document is a set of lists detailing what is needed to rehabilitate each of the health facilities in central and southern Mozambique. A document such as this would be very useful to an aid agency looking to contribute in some way, as it specifically states what the government needs, and leaves no room for speculation. It lessens the burden of unwanted and unusable donations.

Much of the nation's infrastructure was destroyed, including many of the roads. Several parts of the main highway connecting north and south Mozambique were washed away, and the railway lines that connect to Republic of South Africa, Swaziland and Zimbabwe were cut.

The All Agencies Approach

The publication *Manual de Atenção à Saúde em Situação de Emergência* (Manual of Health Priorities in Emergency Situations 1992, p. 8) states 'in an emergency, it is necessary to have collaboration between a lot of people' (translation). This is the basic, underlying principle of the All Agencies Approach. Once again, the manual seems to have a comprehensive grounding in disaster management principles, and would make a suitable policy document. However, as previously reported, it was not mentioned at all in the interviews or referred to in any of the documents collected for this study.

There was very little collaboration or coordination during the early stages of the floods, which the Ministry of Health identified and rectified by implementing a certificate system, described below.

Every organisation that was working or planning to work in the area of health was required to register with the Ministry of Health in order to begin or continue work. A letter of application from each organisation was required, which needed to include the names of people working in the health sector, basic background information on the organisation, the proposed activities, and the location of these activities. This provided the Ministry of Health with a profile of the aid agencies working on disaster relief during the floods. Once an application was processed, which was usually immediately, a certificate was issued. Without this documentation, organisations were not able to provide relief in Mozambique, and their workers may have even had their visas revoked. The purpose of this exercise was not to regulate the organisations, but rather to increase communication and collaboration between the government and aid organisations, and also between aid organisations themselves.

A document entitled *Floods in Mozambique: Situation Update and Health Intervention* (2000) was distributed by UCITE to all international volunteers working in the health sector. It contained, among other information, a list of aims of the health activities coordinated by UCITE, a set of strategies to control epidemics, and a list of 'steps for a good coordination'. The three members of UCITE that were interviewed all stated that the document was widely distributed and adopted. One of the steps for a 'good coordination' is requesting a certificate of approval from UCITE. As previously explained, a letter of intent was needed in order to be considered for certification. These letters were all available and perused at UCITEs headquarters, and fell into two distinct categories, those who *asked* what was needed, and those who *told* what they were going to do.

An interesting group of people that UCITE identified as stakeholders in disaster management were traditional healers. Approximately 55% of Mozambique's population are involved in traditional religions or have indigenous beliefs (*Geographica* 1999), in which traditional healers are held in high esteem. It was identified that the government should communicate with these religious community leaders in order to elicit the most comprehensive approach possible. An impediment to disaster relief was found in some traditional religions, where the community believed the floods were 'God's wrath' or punishment from the spirits for wrongdoing of the people. One interviewee stated that traditional healers can sometimes have the determining role in disaster management. A majority, however, accepted relief when it was offered. Religion is an important part of many people's life in Mozambique, and many rely on it to provide them with direction in difficult times. As an example of this, one interviewee from UCITE stated:

> In civil society, religious groups are very strong and a very good link to the people. For education and advice, they are very influential—the churches have a very big role. If you turn up with a bunch of doctors or even the army, no-one will listen, but if you have a priest, everyone does what you say.

The Prepared Community

A common theme throughout the data was the solidarity amongst those affected by the floods. It was mentioned by all the interviewees and even identified by Mozambique's President, in a 'Message of Thanks' to all nations involved (Chissano 2000). Having a cohesive community greatly enhances the concept of the Prepared Community, as people are more likely to 'look out' for each other.

Another important aspect of this concept is having a community that recognises potential hazards and is proactive in reducing the associated risks. This is very difficult for those that live in urban slums and unplanned settlements, where living from week-to-week is more of a priority than disaster planning. It was evident from this research that poverty greatly impedes the

communities' capacity to prevent or prepare for disasters. It is often these populations that are also most vulnerable to the effects of disasters.

Helping others in need is one of the cornerstones of the Prepared Community concept, which may be culturally inappropriate in some societies. In Mozambique, this was not the case, as many people were willing to volunteer. However, the volunteer force was well below that of developed nations because of the simple fact that most people cannot volunteer for free if they want to keep themselves and their families alive. Due to this fact, the largely western-adopted notion of voluntary work in the Prepared Community concept may not be appropriate in lesser developed nations.

Discussion

Possible barriers
Poverty affects all aspects of life, especially health (Najman 1994). When a community is composed of individuals struggling to survive day-by-day, the concept of the Prepared Community becomes a relatively less important issue. The definition of a disaster, as described by Australian Institute of Environmental Health (1991), states that an event becomes a disaster when a community faces severe danger and incurs losses. Everyday life for those living in poverty involves severe danger and incurring losses.

This is not to say that the concept of the Prepared Community is not relevant to Mozambique, but rather that poverty has to be taken into account and considered when evaluating the effectiveness of Prepared Community-type activities. This was consistent with Karand and Aksit (1999) who stated that it was crucial to understand both the attitudes and resources of the community in order to develop a disaster management plan that could be integrated into the vulnerable community. According to Tarrant (1998), the concept of the Prepared Community has not been well implemented in developed nations, such as Australia. Therefore implementation into developing countries such as Mozambique, which has a larger proportion of its population vulnerable to disasters, would be much more difficult.

Are disaster management principles still relevant?
The 1999–2000 Mozambican floods were truly a large-scale disaster. Literally all government employees were involved in the response in some way. This may have occurred because the floods were on

everyone's agenda, and collaboration between government departments and with other organisations was necessary. The government provided political and financial support for those working in the management of the floods.

However, not all disasters are so all-encompassing. There are several disasters every year in Mozambique that affect specific populations, and not the whole country, such as disease outbreaks, fires or loss of fertile land. It is necessary to have a useable disaster management plan for these situations as inevitably there will be reduced political and financial support. Clearly defined roles and responsibilities need to be spelled out for each of the relevant stakeholders, rather than each stakeholder developing a plan in isolation. This was consistent with approaches by both Quarantelli (1994b) and Salter (1998).

Generally, the management of the floods did not comply with internationally accepted concepts of disaster management. The reason for this was because there was minimal planning and no useable disaster management plan, as previously explained. Despite this, this study shows that elements of the All Agencies Approach and the response component of the Comprehensive Approach were more effectively accomplished than the other concepts, such as the Prepared Community, the All Hazards Approach and the prevention, preparedness and recovery components of the Comprehensive Approach.

Conclusion
The four 'internationally accepted' disaster management concepts have been implemented successfully in several developed countries. This study has proposed that they are also relevant in developing countries, although the issue of poverty alleviation must be considered when interpreting the concepts. Although some application of the disaster management concepts were quite lacking in the 1999-2000 Mozambican floods, when economic and social considerations are understood, the concepts are quite relevant and useful to developing countries. Poverty alleviation should always be the top priority, but disaster management planning within the economic constraints of developing countries would greatly reduce the extra burden caused by disasters.

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Commonwealth aviation disaster planning

A workshop to inform the development of a Commonwealth Aviation Disaster Plan (CAVDISPLAN) was held at the Emergency Management Institute in November 2001. Thirty five people representing the Commonwealth, State and Territory governments and the aviation industry attended the workshop.

Participants identified gaps and overlaps in current planning through consideration of three scenarios—a crash on airport, a crash in a remote area within a State jurisdiction, and a crash about 15 nautical miles offshore outside State jurisdiction.

Work has now commenced on developing the plan. Much of the work will be guided by a representative planning committee. The plan should be finalised by mid-2002.

For further information contact:
Mark Sullivan
phone: 02 6266 5050
email: msullivan@ema.gov.au

Telecommunications disaster planning

The Australian Communications Authority (ACA) has released for comment a draft Telecommunications Industry Guideline entitled 'Telecommunications Support for Emergency Management'. This guideline outlines how the Telecommunications Industry can best coordinate a response to requests from Emergency Service Organisations for the provision of short notice telecommunications services during emergencies.

To enable the guideline to be implemented as an Industry endorsed document, it has been referred to the Australian Communications Industry Forum (ACIF) for further consideration by an ACIF working committee.

For further information contact:
Mark Sullivan
phone: 02 6266 5050
email: msullivan@ema.gov.au

Exercise Long Reach 2001

Mr Steve Banks from EMA recently participated in an Australian Defence Force Exercise Long Reach 2001 in PNG. Long Reach Exercises are conducted annually to practice the Australian Defence Force's Deployable Joint Force Headquarters in planning for combined and contingency operations.

The aim of Exercise Long Reach 2001 was to practice ADF, PNG Defence Force and Royal PNG Constabulary staff in contingency and operational planning procedures for conducting potential Humanitarian Assistance missions in PNG.

For further information contact:
Steve Banks
phone: 02 62665505
email: sbanks@ema.gov.au

Tropical Cyclone Waka

Tropical Cyclone Waka struck Tonga in early January 2002 causing considerable damage to buildings and crops in the northern part of the country. Following a request from the Government of Tonga, the Australian Government undertook to provide emergency relief supplies.

The Australian Agency for International Development (AusAID) requested EMA to coordinate the task under the provisions of the Australian Government Overseas Disaster Assistance Plan (AUSASSISTPLAN).

An Australian Defence Force C130 Hercules subsequently transported a load of shelter materials, water containers and water purification tablets to Tonga.

For further information contact:
Steve Banks
phone: 02 62665505
email: sbanks@ema.gov.au

NSW Bushfires

The devastating bushfires in NSW in late December 2001 and early January 2002 led to a number requests from the NSW Government for Commonwealth assistance. The requests presented an opportunity to test new request approval processes which had only been developed in early December due to EMA's move to the Attorney General's Department. The Task was made more challenging with reduced staffing levels for the Christmas period.

Tasks approved by the Attorney General included the provision of four ADF helicopters for aerial observation, transport, and subsequently, water bombing; helicopter refuelling facilities; water tankers and accommodation facilities at Singleton and Nowra.

For further information contact
Don Patterson
phone: 02 6266 5165
email: dpatterson@ema.gov.au

Chemical Biological Radiological issues

The post-September 11 anthrax incidents which resulted in deaths in the United States received significant media coverage world-wide. Subsequently, there was a large number of anthrax false alarms and hoaxes in Australia with emergency services from all States and Territories being called to respond. Fortunately, public awareness information and procedures for responding to suspicious packages developed by the National Chemical Biological and Radiological Working Party (NCBRWG) were able to be quickly implemented.

The NCBRWG recently met to review the anthrax call-out arrangements. While Anthrax related hoax and false alarms continue, State emergency services and the Public Health Laboratory Network have refined their arrangements enabling minimum inconvenience to potential victims and the provision of rapid analysis of samples.

For further information please contact:
Don Patterson
phone: 02 6266 5165
email: dpatterson@ema.gov.au

International Search and Rescue Advisory Group (INSARAG) activities

Regional Group meeting:

The INSARAG Asia-Pacific Regional Group met in Christchurch, New Zealand during the period 28 to 30 November 2001. Sixty-two participants from 19 countries attended to further develop procedures for responding international search and rescue teams to structural collapse disasters within the region.

Team Leaders meeting:

An INSARAG Team Leaders meeting was held in Sydney during the period 3 to 5 December 2001. Fifty-nine participants from 17 countries attended the meeting which was co-hosted by Emergency Management Australia and the New South Wales Fire Brigades. This was also the first Team Leaders meeting to be conducted outside the United States. The meeting provided an opportunity for the leaders of search and rescue teams which respond internationally to exchange experiences and lessons learnt from recent disasters and to discuss and improve capabilities and operating procedures. A highlight was a briefing by members of the Miami/Dade and Fairfax County Urban Search and Rescue Teams who had been involved in the response to the attacks on the World Trade Centre and the Pentagon.

International Search and Rescue convention:

Representatives from 25 countries plus the International Federation of Red Cross and Red Crescent Societies convened in Geneva on 24/25 October 2001 for the 3rd Meeting of the Core Group developing a legal framework for international Urban Search and Rescue (USAR) assistance. The Meeting noted that there were a number of impediments to obtaining agreement to a legally binding convention and agreed to pursue development of a UN General Assembly Resolution to be presented at the 57th Session on the UN general Assembly in late 2002.

For further information contact:
Trevor Haines
phone: 02 6266 5169
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Awards ready to go again

The Australian Safer Communities Awards are ready to roll again in 2002.

For the third year, the Awards will recognise the work of organistions and individuals in keeping communities safer. Last year, 13 organisations (representing another 20 organisations) received National Awards.

The Awards will again be open to volunteer organisations, State and Federal government bodies, local government and the private sector. The combined stream, introduced last for organisations that combined for projects, will be offered again this year.

Categories will remain the same—post-disaster and pre-disaster—with the post-disaster category restricted to the action taken in response and recovery.

Entries will cover projects completed in the period from January 2001 to March 2002.

For further information contact:
Tom Parkes
phone: 02 6248 9344
email: tparkes@cpac.com.au

Applications for project funding

A selection panel of government and industry representatives, emergency managers and academics will soon begin assessing applications for project funding as part of the Projects Program 2002–03 administered by Emergency Management Australia (EMA).

With applications closing on 15 February more than 1590 people with internet access had visited EMA's web site by mid-January to down load Project information and the application form.

This increased public interest is seen as being the result of a combination of advertisements in newspapers around Australia and direct mailing to target groups involved in the areas of disaster and emergency management.

Major themes for the Projects Program 2002-03:

* emergency management education in schools
* private sector participation in emergency management
* volunteers in emergency management
* warning systems and communities.

For further information contact:
Rob Taylor-Pyke
Phone: 02 6266 5497
Email: projects@ema.gov.au

Report flows from Volunteers Summit

The consolidated Report from the Volunteers Summit coordinated by Emergency Management Australia (EMA) in October 2001 is nearing completion.

When published, the Report will not only be sent to the 400 emergency management volunteers and representatives of volunteer organisations who attended the Summit, but it will also go to key government officials at all levels and other relevant stakeholders.

Continuing the theme of 'Value your volunteers, or lose them', the Summit Steering Committee has already met to evaluate the various presentations/ discussions and outcomes, and taken initial steps to implement a number of the recommendations.

Other recommendations will be passed to a yet to be formed 'national peak body' for implementation.

For further information contact:
David Winterburn
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Email: dwinterburn@ema.gov.au

Emergency Management Australia Institute

With the move of Emergency Management Australia to the Attorney-General's portfolio, it is an opportune time to align the names of the two parts of EMA. Mt Macedon site will now be referred to as the Emergency Management Australia Institute.

Exotic Animal Diseases

In response to the COAG Review into Australia's arrangements for a response to an outbreak of Foot and Mouth disease, EMA staff have been heavily involved in providing assistance to the Task Force established to advise the COAG. Peter Koob has been working virtually full-time with AFFA staff, helping them with planning and training activities. Dudley McArdle has been appointed to direct the national simulation to be held in August 2002 to validate the arrangements.

James Gustus (on secondment from VICSES), Trevor Haines, Barry Dean and Merrick Chatfield have all been involved in providing advice and assistance.

Research

The Strategic Research Agenda that was developed in consultation with stakeholders during 2001 will be implemented in the course of 2002. From the priority areas that were identified in that process a number of projects are being developed in partnership with EM agencies around Australia they include:

- community centred EM
- more comprehensive methods for valuing disaster loss in particular indirect and intangible costs
- emergency management and indigenous communities
- methods for valuing the contribution of emergency services
- warnings for rapid onset events.

Training Needs Assessment

A training needs assessment has been conducted over the last twelve months in order to assist the Emergency Management Australia Institute to make some decisions about what educational and training activities it will offer in the next and proceeding financial years. Draft results have been presented and implications have begun to be discussed. The report will be finalized over the next month.

What's on at EMAI

EMAI Program of Activities for the Financial Year 2002/2003

There are a number of ways that the Program of Activities and details about courses can be accessed. They are:

- The EMA website, www.ema.gov.au
- The EMAI Handbook, which will be available from the beginning of April. The Handbook is obtainable from EMAI or the state/territory nominating authorities

Emergency Management Australia
PO Box 1020, Dickson, ACT 2602, Australia

Emergency Management Australia Institute
Mt Macedon Rd, Mt Macedon, VIC 3441, Australia

IDRM
INTERNATIONAL

INSTITUTE for DISASTER RISK MANAGEMENT

1st International Disaster Risk Management Course IDRMC-1

Graduate Certificate in Emergency Management, Manila, Philippines

The International Institute for Disaster Risk Management (IDRM), formerly the Asia Pacific Disaster Management Centre (APDMC) and its partner, Charles Sturt University (CSU Australia), are pleased to present their new, state-of-the-art International Disaster Risk Management Course (IDRMC-1), a learning pathway to the award of a Graduate Certificate in Emergency Management.

Benefits and Features of this IDRM Course

Comprehensive introduction to disaster risk management: You will learn world best practice including proactive strategies in disaster risk prevention, preparedness, mitigation, response and recovery. You will study an internationally recognized Risk Management framework and its applications to disaster risk reduction and sustainable development.

Recognized professional qualifications: IDRMC-1 is a university-accredited course. Participants who successfully complete the residential course and all the assessment items will be able to apply for credit consideration for half of the requirements of CSU's Graduate Certificate in Emergency Management.

Practical and experiential learning: Through the field component you will gain first hand experience in applying participatory risk and vulnerability assessment tools and community preparedness strategies. Past courses have included visits to communities affected by the Mt. Pinatubo eruption, exercises at the village level, and visits at the Philippines National Disaster Coordinating Council (NDCC), Corporate Network for Disaster Response (CNDR) and PHIVOLCS Institute.

Distinctive Faculty: You will learn from experienced resource persons and facilitators with practical expertise in disaster risk management from various parts of the world. IDRM's own well-known resident experts will also share their knowledge and lessons from past and on-going projects.

Personalized and interactive learning: Take advantage of a special opportunity to study and apply world best practices to your own disaster risk management problems, through your own Personal Learning Plan (PLP) and through exchange with colleagues from other parts of the world.

Course Fees
The fee for the residential course is US$2,000, which includes tuition, course materials, lunch, snacks, field trip transportation and certificates. The fee for the distance learning component is Aud 1,600, or US 850 approx (excluding textbooks). Special rates are also offered for early and group registration.

The International Institute for Disaster Management (IDRM), Philippines
The International Institute for Disaster Risk Management (IDRM), formerly Asia Pacific Disaster Management Centre (APDMC) is a regional, technical resource in disaster risk and conflict management, delivering programs to both public and private sectors internationally. IDRM's philosophy is to promote the sharing of international standards and best practices in natural, technological and conflict related disaster and risk management through active cooperation with its extensive partnership network.

More information and registration:
Mr. John Barrett, CEO, International Institute for Disaster Risk Management (IDRM)
Telephone: 632 817 1434   Facsimile: 632 817 0894   Email: info@idrmhome.org or gerry@idrmhome.org
www.idrmhome.org

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About the author
Beau Martin is currently undertaking a PhD on the sustainability of aid given to developing countries, at Queensland University of Technology. The disaster management study was undertaken as part of an honours degree for a bachelor of health science, for which Mr Martin received 1st class honours.

He has an active interest in health and sustainable development in developing countries, and has been employed by the Australian Agency for International Development to undertake a medical waste segregation program for Mozambique.

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This article has been refereed

Conference Announcement

5th New Zealand Natural Hazards Management Conference 2002

Te Papa, Wellington, New Zealand
14-15 August 2002
Optional Field Trip: 16 August 2002

The Institute of Geological and Nuclear Sciences (GNS), the National Institute of Water and Atmospheric Research (NIWA), Ministry of Civil Defence and Emergency Management, Wellington City Emergency Management Office, Wellington Regional Council, and the Earthquake Commission (EQC) invite you and your colleagues to participate in the 5th New Zealand Natural Hazards Management Conference in August 2002.

Target Audience
Emergency managers, planners, risk assessors, utility managers, natural hazards researchers and scientists.

Theme
The conference will provide a forum to discuss the integration of hazard information into effective risk management, including:
- applying hazard information to best practice planning
- exploring new technologies — advances in science application
- natural hazard mitigation for industry
- creating resilient communities through integrating science and practice

Conference Format
The conference will feature keynote addresses, case studies, formal presentations and poster sessions.

Pre conference short courses
Several pre conference short courses are planned. Further details will be available later.

Post conference Field Trip
A one-day optional field trip is planned for 16 August 2002. The trip will visit sites around Wellington to discuss local hazard issues and see examples of successful hazard mitigation strategies.

Registration
Registration and program details will be sent out late May 2002.

More information
Diane Tilyard, Wairakei Research Centre
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Email: d.tilyard@gns.cri.nz

Development for disaster reduction—
the role of the World Bank

by Margaret Arnold, Senior Program
Officer for the World Bank's Disaster
Management Facility and Piers Merrick
consultant for the World Bank's Disaster
Management Facility[1]

Conventional wisdom dictates that the World Bank is 'not in the disaster business' — that disasters are best left to organisations such as the International Federation of Red Cross and Red Crescent Societies (IFRC), the United Nations, and local NGOs to issue appeals and channel emergency funding and relief supplies to crisis situations.

Indeed, the Bank's Articles of Agreement and policy state very clearly that the Bank is not a relief organisation, but provides recovery support, which has been traditionally focused on macroeconomic stability and rebuilding physical capital to get the country 'back on the development track'.

This traditional sentiment, however, reflects a narrow view of the disaster business, considering only the immediate relief phase. In reality, the Bank has been, and continues to be, one of the largest and most influential players in the disaster business, providing more than US$23 billion in disaster related lending since 1980.

This figure comprises more than $10 billion in natural disaster reconstruction operations, plus the total loan amounts for projects including prevention and mitigation components. Total Bank investment in reconstruction operations, however, greatly exceeds $10 billion, since these figures do not include loan amounts reallocated from ongoing development projects to help finance urgent activities following a natural disaster.

Natural disasters have grave impacts on the core business of the World Bank, which is sustainable development and the alleviation of poverty. Seen in this context, the Bank's involvement is not only significant, but also essential to meeting its developmental mission. Indeed, disasters are a development issue.

The World Bank's active disaster management portfolio

In the World Bank's most recent *World Development Report*, the effects of natural disasters are established as an important dimension of the poverty that affects nearly 4.8 billion of the world's 6 billion population. It is well known that disasters disproportionately affect the poor (that are least able to cope with their effects) and that these disasters can cost as much as 20 times more as a proportion of GDP in developing nations than in industrial nations.

With many of the poor living under significant threat of disaster, their vulnerability to disasters is every bit a defining characteristic of their poverty as the material devastation that disasters bring in their wake.

Over the last two decades the number and scale of natural and technological disasters have been increasing—worsening both in terms of the loss of lives and the extent of the physical destruction caused—and there has been a corresponding increase in the demand for World Bank assistance related to disasters.

In 1999, natural catastrophes and man-made disasters claimed more than 105,000 lives worldwide and resulted in total losses of around $100 billion. Landslides in Venezuela caused around 50,000 fatalities, the Izmit Earthquake in Turkey 20,000 and the cyclone in Orissa, India 15,000. It is estimated that in the past decade, the average annual losses of infrastructure due to natural disasters in Asia alone amount to $12 billion or about two-thirds of the total annual investment of the World Bank.

The World Bank's active portfolio of disaster-related projects covers the spectrum of hazards, from floods, storms and drought to those such as wildfires, landslides, earthquakes and insect infestations. The Bank's involvement also spans the breadth of sectors—from agriculture to transportation, urban development to water supply and sanitation. The breadth of this portfolio reinforces the fact that disasters do not simply cause loss of life and property but that their effects ripple through all the productive sectors of an economy, derailing development and stifling growth.

Types of disaster currently addressed by World Bank projects

Of the 100 or so active disaster projects, the agriculture sector alone accounts for nearly a third. In a majority of these cases (30 out of 36), the projects are standard lending operations with disaster prevention or mitigation components rather than reconstruction projects.

Typical examples include irrigation projects with some flood or drought control components, or forestry projects
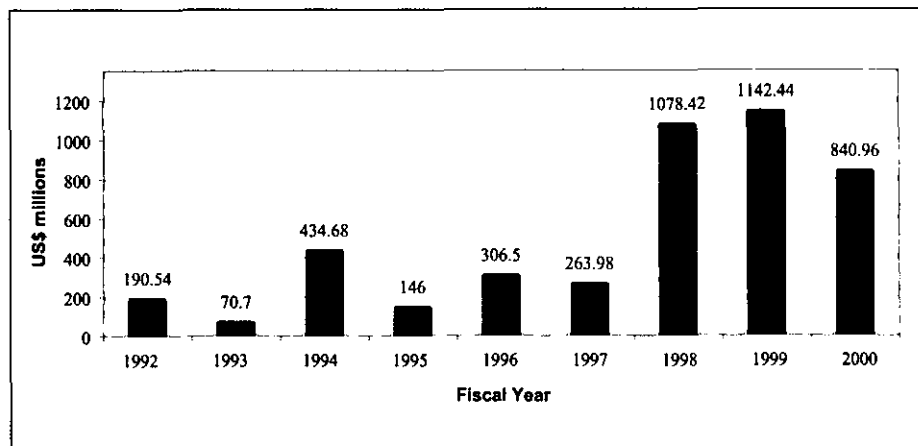
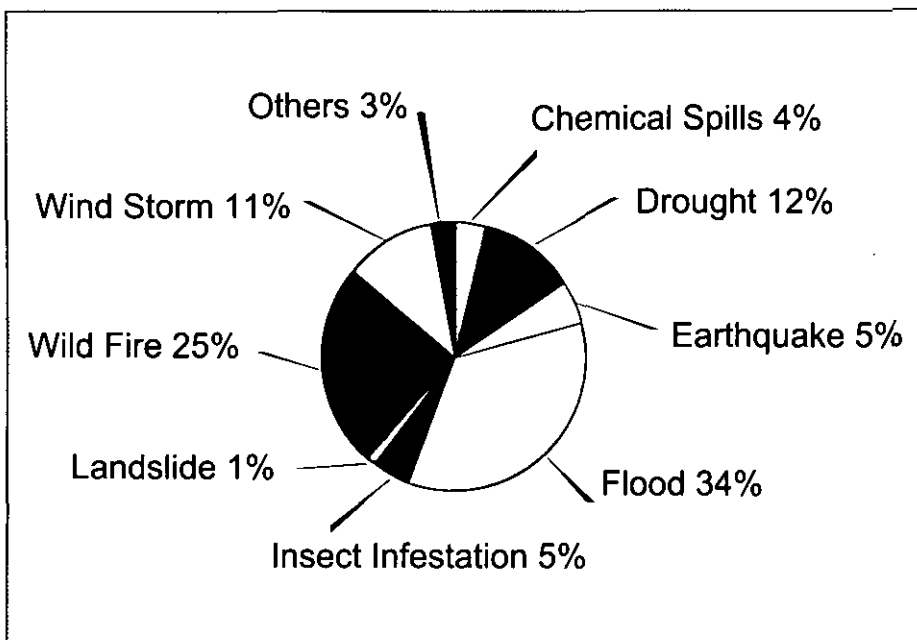Figure 1: Lending volume for disaster-related projects.

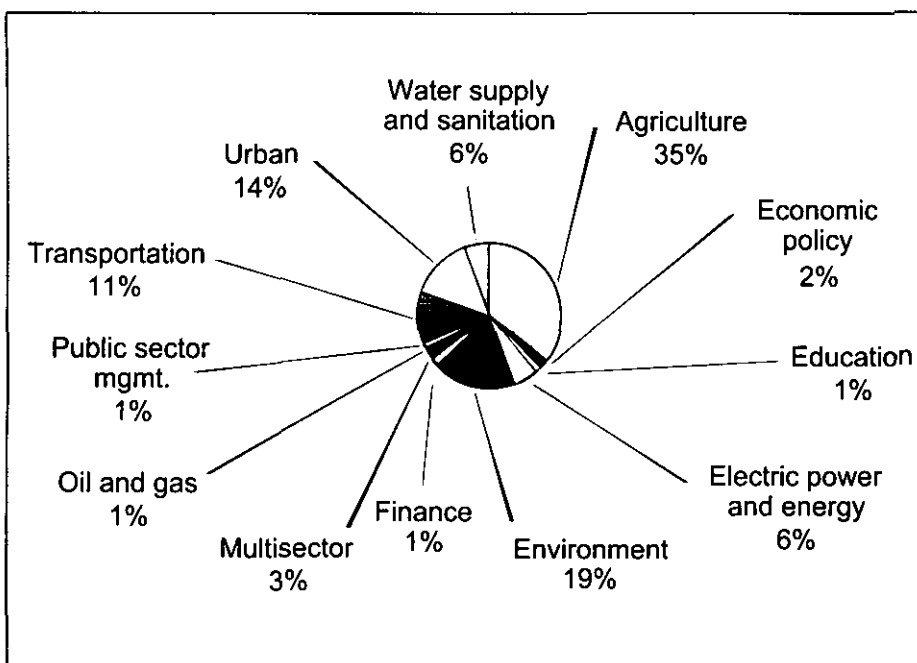*Figure 2:* Active disaster-related projects by disaster type.

Figure 3: Active disaster-related projects by sector.

with activities focused on capacity building for fire prevention or fire fighting. The environment sector provides another significant part of the portfolio where the majority of these projects are natural resource management projects with disaster prevention components.

In contrast to both the agriculture and environment sectors, the urban development and transportation sectors (together accounting for 25 per cent of active disaster related projects), are predominantly reconstruction projects. While this might be expected—as infrastructure needs to be rebuilt following disasters—it may also point to the vulnerability of physical infrastructure and the need for

longer-term protection of these investments.

Learning from experience: reconsidering the World Bank's role in disaster risk management

A closer analysis of the evaluation of the World Bank's disaster-related portfolio draws out several clear lessons that deserve consideration as the Bank prepares future projects. These lessons include, among others:

• the importance of involving the affected communities in designing and implementing recovery operations to ensure their success

• keeping reconstruction operations

simple in design and flexible to respond to emerging needs.

But perhaps the most vital lesson from Bank experience is that reconstruction efforts are by themselves an insufficient response to natural disasters, unless they go beyond mere rebuilding to address the underlying conditions that contributed to the disaster event.

While Bank projects have traditionally been reactive, there is a gaining recognition that disasters are development failures, and that poverty and disasters go hand in hand.

The prevailing attitude in many poorer countries is that evident and pressing development needs outweigh calls for *ex ante* investment in disaster preparedness and mitigation. Disaster prevention and preparedness are luxury items. This attitude can often be exacerbated by a 'disconnect' between national and sectoral development plans on the one hand, and the recurring nature of extreme natural events and disaster vulnerability on the other.

As a result, several countries have approached the Bank in the last decade more than once to request emergency recovery assistance for the same type of disaster in the same region or province. Among these countries are Argentina, Bangladesh, India, Sudan, and Yemen.

To highlight the need to get off the disaster/reconstruction treadmill, the Bank established the Disaster Management Facility (DMF) in 1998, which provides leadership in the area of disaster risk management.

The DMF is working actively to ensure that risk analysis is integrated into project design, that effective prevention and mitigation measures are integrated into country assistance strategies and projects, and that investments made in social and economic development are properly protected.

The DMF provides operational support to all regional and country units working with disaster prone nations or in the aftermath of a disaster. On an institutional level, the DMF is also helping the Bank to update its policy on emergency recovery assistance to allow a more strategic response to disasters and a stronger commitment to disaster prevention.

The DMF also works with stakeholders in and outside the World Bank to develop practical solutions for reducing disaster risk. As an example, the DMF is now working with the International Finance Corporation and the World Bank's Financial Sector to explore ways to ensure that investments made in social and economic

development are properly protected through adequate insurance coverage. For the very poor, who lack access to traditional insurance mechanisms, the DMF is working with partners like the United Nations Development Programme (UNDP) to explore microfinance instruments for disaster risk.

While the DMF has only been operating for three years, pilot efforts of the unit are already having a positive impact on Bank operations. A good example of this is the case of Mexico. As a direct result of a 1999 DMF study on the Mexican Government's capacity to manage disaster risk, the Government requested a loan addressing the needs of the *ex ante* initiatives to reduce disaster losses.

This project, approved in December 2000 for an amount of US$404 million, represents an important step taken by both Mexico and the Bank towards a comprehensive and proactive approach to reducing disaster impacts. Similar projects with a preventive approach to disasters are getting underway in other countries such as Honduras, Nicaragua, and Vietnam.

There is gradually far more consideration being paid through Bank projects to mitigating natural disaster events before they occur, rather than on rebuilding after the damage has been done. Globally, there are now 67 active projects supported by the Bank that include substantial components devoted to disaster mitigation compared with only 34 straight reconstruction projects.

The positive trend towards disaster mitigation projects can be noted from the 1980s when 30 mitigation projects were approved by the Bank and in the 1990s when 40 were approved.

Moreover, more recent reconstruction projects have a renewed focus on prevention and mitigation. Bank-supported reconstruction efforts following the 1998 earthquake in Turkey; floods in Cambodia, Mozambique and Vietnam; Hurricane Mitch in Central America and the January 2001 earthquake in Gujarat, India are going beyond mere rebuilding to include components of capacity building for disaster risk management, and other measures to reduce the impacts of future hazard events.

The World Bank has joined a growing group of international agencies and governments—both donors and recipients of international assistance—that are reappraising strategies that focus solely on reconstruction without provision for improving a nation's resilience to future events.

Donors and recipients of reconstruction financing have come to question the efficiency and value of replacing critical infrastructure only to see these investments destroyed in successive disasters. Disaster relief, unsupported by prevention and mitigation measures, does little to improve a nation's resilience to future disasters.

Some concluding thoughts

Disasters are a tremendous challenge to development as they represent wiped out investments and undermine efforts to fight poverty.

The international community has come to regard the issue of disasters as a subset of the development issue, and the Bank is learning that measures taken to reduce the impact of disasters provide an effective vehicle to make substantial advances in the fight against poverty.

The Bank is taking positive steps to bring its strategies and procedures up to date and promote proactive ways to integrate disaster prevention and mitigation into its development work.

The Bank has long been a leader in providing reconstruction assistance, and is well placed to lead the way to a more proactive, prevention-oriented approach so that all development activities contribute to reducing disaster losses in client countries.

When 'regular' lending helps to reduce disaster losses in vulnerable countries, the Bank's mission of fighting poverty will be greatly enhanced.

Book Review

Mental Health Services in Disasters: Manual for Humanitarian Workers and Instructors Guide

By Raquel E Cohen M.D., M.P.H. University of Miami; School of Medicine, Miami, Florida.

Published by Pan American Health Organization in coedition with Editorial El Manual Moderno, S.A.de C.V.

Manual: 75 pp, ISBN 968 426 878 5.
Instructor's Guide: 176pp, ISBN 968 426 8793

Reviewed by Barry McPhee, Queensland State Disaster Coordination Group Member

The Mental Health Services in Disaster Manual for Humanitarian Workers is a basic compendium of current knowledge on approaches and procedures used by mental health workers to help survivors and disaster workers recognise the signs of trauma and assist recovery. The manual is accompanied by an Instructor's Guide aimed at mental health workers involved in training and supervising those who assist survivors to respond effectively to the aftermath of disasters.

Each of the five chapters of the manual provides a fundamental body of knowledge which sequentially enhances the capacity of the disaster worker to participate in emergency and post-disaster assistance programs in unison with other agencies. Each chapter is formatted into Learning Objectives, Content and Reading Lists.

The manual sets the context with an Historical Overview of the Mental Health Role followed by Basic Mental Health Content and the Developmental Phases of Survivor Behaviour. The chapter on Post-disaster Intervention Programs provides mental health workers and consultants with intervention models and methodologies while the chapter on Populations with Special Needs provides a preparedness and planning alert for all involved in disaster management and operations.
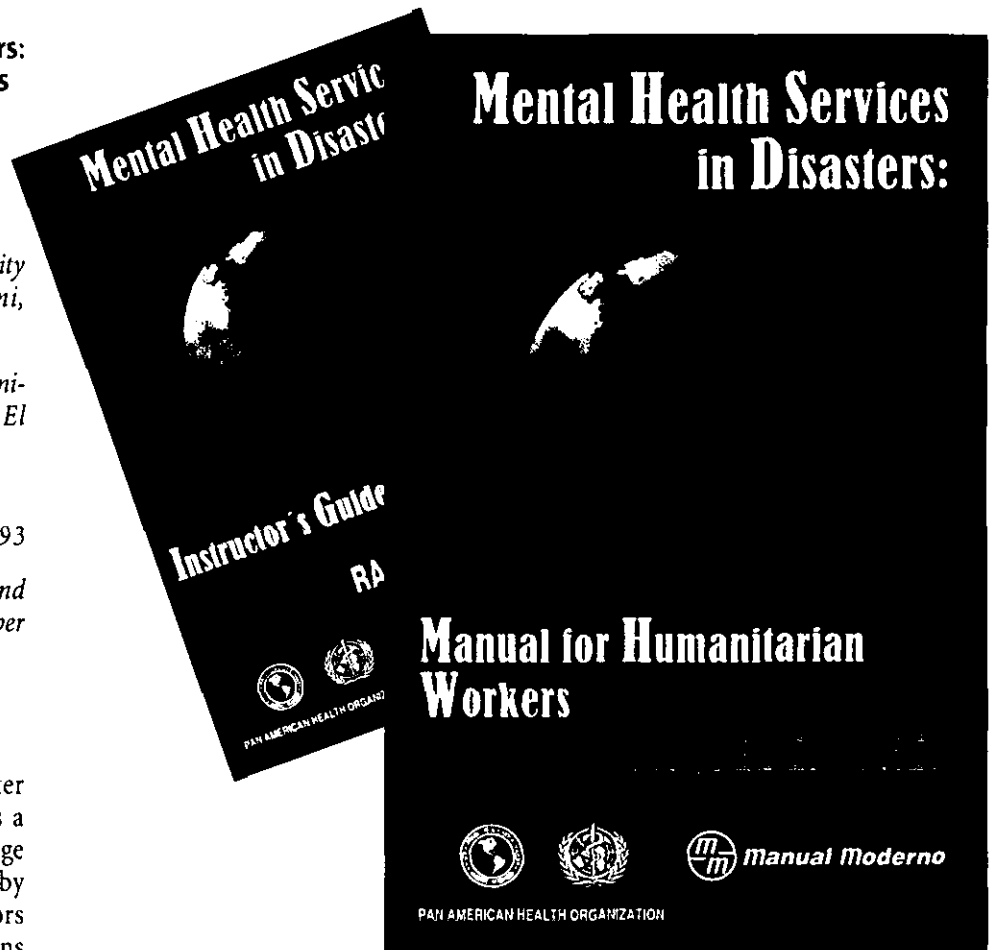
The accompanying Instructor's Guide mirrors the chapters in the manual. It is designed to assist mental health professionals deliver training and supervision to post-disaster counsellors and workers in the behavioural sciences from professional to paraprofessional.

The format of the guide comprises five modules each including Learning Objectives, Educational Methods, Teaching Aids, Content and Guidelines for Exercises. The training aids are comprehensive, providing the format of transparencies, slides and handouts.

Although the Instructor's Guide mainly provides resources for mental health trainers, the Historical Overview and Populations with Special Needs chapters, particularly the section on disaster workers as secondary victims, will be useful to all disaster managers.

The companion volumes Mental Health Services in Disasters: Manual for Humanitarian Workers and Instructor's Guide offer conceptual and practical information and teaching resources for workers in the disaster situation as distinct from the clinical setting.

Availability
These publications can be obtained at:
PAHO Online Bookstore
http://publications.paho.org
(a secure ordering site) or,
 through the PAHO Distribution Center:
PO Box 27, Annapolis Junction
MD 20701-0027, USA
Fax: 301 206 9789
Email: paho@pmds.com

Cost and order codes:
Instructors Guide 2000:
Cost: US$18.00
Order code: OP 131
http://publications.paho.org/english/
moreinfo.cfm?Product_ID=567

Humanitarian Workers guide 2000:
Cost: US$18.00
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The Lassing Mine disaster – a retrospective

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Introduction

The mining disaster at Lassing, in which 10 miners died, has been the subject of extensive and detailed technical investigation. There are however many other issues that arose through the rescue and subsequent investigation period. These issues had some influence on the overall rehabilitation process and are concerned more with the sociological and psychological aspects including the interrelationships between company management, employees, politicians, government agencies, relatives and local community. Unfortunately tragedies such as occurred at Lassing, whether they be natural or man-made, will always occur. It is recognised that not everything went smoothly at Lassing and we should ensure that the lessons learnt from our experiences will help reduce any future impact and consequences to a minimum. The importance of crisis planning and management is emphasised. This paper reflects author's experiences in having spent almost three years at Lassing through the phases of post accident investigation, the court proceedings and final closure of the mine.

The incident

At about 10am on Friday 17 July 1998 a miner, Georg Hainzl, found himself trapped in a restroom on an upper level of the Lassing Talc Mine in Steiermark, Austria, following an inrush of water and mud. The Lassing operation which commenced mining in 1901 was taken over by Naintsch Mineralwerke GmbH (referred to as the Company and located 100km away in Graz) in 1974.

A significant subsidence appeared on the surface and houses located in close proximity to the subsidence began to tilt and move. The entire mining workforce returned to site to assist in the rescue. Company officials came from Graz, the headquarters of Naintsch, and officers from the Provincial and Federal Mining Authorities arrived from Vienna and Leoben. By mid afternoon the site was overwhelmed by the media, representatives of various authorities, fire brigade officers, local community members, police, friends and family of the trapped miner and the rescue miners, and general onlookers. In all, some 700 people were at, or around, the mine site. Local and Graz management, together with the officers of the mining authority and the rescue team, spent much of the afternoon and early evening underground developing and effecting one of the rescue plans.

Suddenly, at about 9:30pm, there was a large noise and houses on the surface began to slide into the crater which was rapidly increasing in diameter and depth. Those at the pit head felt a strong rush of air expelled from the shaft. At that point it was realised that a catastrophe had occurred and that the people who were underground, nine miners and one technical expert, were in terrible trouble.

After 9 days of intense activity, Georg Hainzl was rescued via a drill hole from the surface. This raised hopes that the others may also have survived so rescue attempts continued for a further 3 weeks. They were halted on 14th August 1998. An investigation program commenced to establish the cause of the accident and to investigate possible options for gaining access to the mine. This program continued until the end of 1999. A legal inquiry was also established culminating in a court case that commenced in January 2000 and concluded in July 2000. The Government agreed in April 2000 not to proceed with recovery of the missing miners, to permanently close the mine and to allow rehabilitation of the surface. This work is currently in progress.

To put this tragedy into perspective, the nine Lassing workers comprised almost the entire mining workforce. Most lived in and around the Lassing village and had relatives and family living within 5km of the site. Some relatives, including brothers, fathers and sisters also worked in the Lassing Talc works. Two houses were destroyed and two so badly damaged that they had to be demolished. Another house had to be abandoned. Some 12 families had to be relocated. The main local road was cut and had to be diverted as well as the local stream. The impact of this accident therefore affected a very small, tightly knit community.

The aftermath

Lassing employees returned to operate the mill and manage the office in late August 1998. Some had had sons and brothers who had died in the accident. Others considered themselves almost as relatives of the dead miners as they had been colleagues for more than 10 years. The mine manager had been at Lassing since the mid 1970's and was considered to be a father figure to many of the employees. Returning to work for them would have added to the already high levels of stress and trauma. Photos of the deceased and their families hung in the office and there was also the constant reminder of the crater.

The Government and the company provided counselling and caring services. These included:

• *For the relatives (widows, children, parents of accident victims):* over approx. 1 year, group therapies and one on one discussions. The carers actually lived with the relatives. There were also trips together with the relatives (e.g. to meetings) and therapy weeks (e.g. Blumau). It is understood that the objectives of counselling were along the themes 'coming to terms with the pit misfortune' and 'life is worth living and continues, even without the deceased'.

• *For the employees:* over a period of approximately three weeks after the accident, counsellors were available for consultation in the works every day. Group discussions were held with the main theme 'coming to terms with the misfortune and relief of mental stress'. In addition there were further group therapies involving the entire staff with the themes 'living together with a hostile public environment (mayor, aggressive neighbours, green activists etc.)' and 'strengthening of the team spirit'.

Psychiatric counselling was provided for the mine manager and is ongoing.

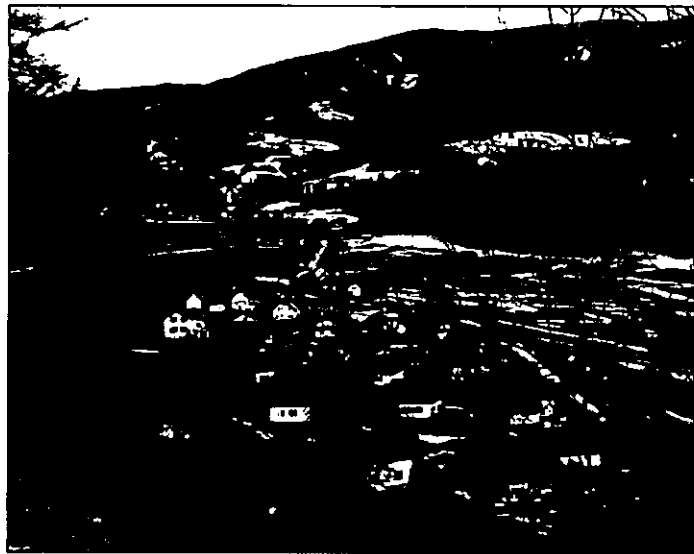Technical investigation of the accident

Figure 1: View of Lassing.

Figure 2: Lassing Mine after the accident.

began almost immediately after the rescue of the miner. The legal investigation commenced in September, some two months later. The legal inquiry was led by the Provincial court prosecutor who took depositions and sworn statements. Comments from employees and colleagues indicated that the process was aggressive and upsetting. It also appeared to provide anyone involved an avenue for making accusations against the Company and authorities, some relating to incidents over 10 years prior to the accident.

These statements played an important role in the court process which followed almost 18 months later. It was noticeable how significant an impact the time-lapse had on the views of the witnesses. The legal process should be able to provide a process which distinguishes between objective and subjective views expressed by the witnesses, given the vulnerable psychological condition of many of the witnesses at the time. It appeared not to do so.

The participants
A tragedy of the scale as occurred at Lassing was a significant event for such a small country as Austria. Apart from the relatives, families, employees and the company management who were directly affected, there were other participants or groups which became involved and which played an influential part. These participants have been identified under the categories of parent company representative; families and relatives; media; politicians; local community; and technical experts. Each group, and the roles played by the participants, is discussed in the following section.

Parent company representative
The parent company, Rio Tinto, sent the author as a representative to the Lassing

site as soon as possible after the accident, initially to provide technical expertise, to assist the site management with the investigation and to generally provide support and assistance wherever it was warranted and useful. This move was in recognition of the pressures that would be placed on local management in dealing with the trauma, whilst at the same time having to plan for, and undertake, a full technical investigation.

The author arrived at site at the beginning of September 1998 and remained, on and off, until the end of the court case in July 2000.

One of the important and difficult aspects of sending a representative to Lassing was the need to send someone who had some understanding of the language and culture to ensure minimal disruption and concessions for acceptance and integration. The initial reaction to the author's presence was mixed. There was a high degree of suspicion that this move suggested monitoring and control from the parent company and that it reflected a vote of no confidence in the local management. Fortunately, as time passed these fears were allayed and the author was ultimately accepted. The role of the representative also changed once a degree of trust had been established. Nevertheless it did allow the author to observe at first hand the interaction between the participants and to make a useful contribution, not only in the technical areas where dealing with the local technical experts was occasionally difficult, but also on a personal level.

Families and relatives
Recognising the trauma of the events on 17 July, psychologists and psychiatrists were quickly appointed to provide

assistance to the families and relatives of the missing, as indicated above. Counselling ensured that people could continue with their lives in as normal a manner as possible. The Church also played a substantial role in providing pastoral care. This assistance was intense for the first few months as families felt the full impact of the tragedy. Scars remained nevertheless, and the relatives appeared to want two things; recovery of the bodies and an explanation for the event (including someone to blame).

As indicated earlier, those relatives of the deceased still working in the Lassing plant and office had returned to work within a few weeks of the accident. The author observed the effects of the accident on the relatives (and other employees) as well as the continuing attention of the press, senior company management and other investigating bodies. Whether returning to work was therapeutic or more stressful is a question for the psychologists but it certainly was not a happy place and very emotional.

There was little or no demand for compensation as the Government and company ensured that the families received immediate and long-term financial support. It is worth commenting that most compensation was paid very quickly to families and affected landowners where the impact was clearly shown. This defused compensation as a major issue. There were to be further claims made much later by other disaffected property owners mainly supported by ambitious lawyers.

Media
As with most incidents of newsworthy significance, the media (press, radio and television) tends to play a prominent part

in, and have a substantial influence on, how things subsequently develop. Lassing has been no different. The situation at Lassing has possibly suffered greater exposure because of the large crater that formed (100m diameter and 40m deep) and which remained exposed to the public and community for more than 2 years after the incident. This constant reminder ensured that Lassing would never be far from public attention. It was noticeable that, until and throughout the trial, pictures of the crater usually accompanied news reports. Compare the Lassing disaster with the recent Austrian ski rail disaster of Kaprun in November 2000 in which far more people died (156) than at Lassing. Media attention has almost ceased only 3 months after the incident.

The involvement of the media has been interesting but not unexpected. Journalists and reporters are, in the main, not technically trained and hence, like the public, are not able to adequately interpret information of a technical nature. What they did was reflect public sentiment.

Initially the press was quite antagonistic towards the company. Accusations of incompetence, arrogance and deception abounded. This was, to some extent, fuelled by the political rhetoric that followed the accident. Anyone who had any comment or theory was given media coverage. No attempt was made to test the validity of such comments or theories. Especially damaging were those opinions and comments made under emotional stress including those of politicians, relatives and management.

A further problem that added to the frenzy of the media (mainly the press), was the fact that no one actually knew what had caused the accident other than mud and water had rushed in from the surface. In such instances the media is likely to listen to anyone with a view – and even add a few ideas of their own.

It is also common behaviour that, when people believe that no one is listening to their points of view or grievances, they believe the only remaining avenue to be heard is through the media.

The media behaved in 3 different ways:
- initially, due to lack of quality information, as a vehicle to establish what happened and to promote the recovery of the bodies
- then, as a supporter of the relatives when it appeared that investigation/ explanation and recovery progress were progressing slowly
- finally, as a voice for the defence at the trial where it appeared that justice was not being done.

Their change in attitude as time progressed appeared to be a result of better management of information flow. The company eventually developed a strategy to supply as much information and in as simple a manner as possible, whereas for some time after the accident, there was no concerted, planned effort to keep the media in the picture.

There are therefore some quite clear lessons to be learned from this. Information is best when it is managed and when it comes from the company. Not because of any manipulative reasons but because the company management actually has the best, most accurate and up-to-date information. The press will go anywhere to get information if it is not available — regardless of its accuracy. Press liaison after the accident and during the rescue was the responsibility of the Mining Authority which, as it happened, appointed a spokesperson who was ultimately charged over the accident. Clearly this was not a good move. When the motives of those involved are examined the danger is obvious. For example, the mayor and deputy mayor of Lassing, the affected landowners of Lassing, the politicians, mining authority representatives, university experts, all had broader agendas than establishing the truth (ie. self preservation, publicity, self protection etc.).

Politicians

A tragedy of the magnitude of that which took place at Lassing will, of necessity, involve numerous government departments at the local, provincial and federal levels. Each has a representative wishing to either express a view or promise some action. As with the media, the problems arising from political involvement at Lassing were basically of lack of understanding. The mechanism that led to the catastrophic inundation at Lassing was very complex and a complete explanation for the tragedy has yet to be found, even after 18-months of determined investigation and a six-month trial. Yet, politicians felt obliged to offer some kind of quick response. They understood that the families of the deceased miners wanted to recover their bodies and they promised that this would happen on the false assumption that this was only a cost issue.

The problem was further compounded when it was realised that recovery of the bodies was not possible, because it was considered to be politically unacceptable to back down from a promise soon after the accident. In this regard Austrian politicians are no different to any other politician. They rely heavily on advice

from others due to their lack of detailed and technical understanding and, in the Lassing case, lack of quality information. The number and diversity of people advising the focal politician at the time of the accident, the Minister for Economic Affairs, was incredible. People who had no connection with, or even knowledge of, the conditions at Lassing (particularly the underground conditions) were offering suggestions to the Minister (and the media) for the recovery of the bodies. There was even dispute among the politicians about the rescue of Hainzl, to the point that the Prime Minister felt obliged to comment.

Whether the lack of information was a driver for the numerous public offerings after the accident, encouraged by the eventual rescue of Hainzl, is not clear, however, the company technical experts and management should have moved quickly to manage the information being transmitted to the press and politicians. Perhaps the Mining Authority should have been the only conduit of information to the Minister however, it is also understood that the Minister was so incensed by the performance of the Authority that he took no notice of them. He subsequently made a number of statements expressing his dissatisfaction with the Mining Authority. A new set of Mining Regulations were issued and the organisation of the Authority was eventually dismantled.

One of the more interesting and concerning aspects of the behaviour of the politicians was their persistence with the commitment to recover the bodies. Although it is understandable that politicians do not like to go back on undertakings it was clear, probably from around November 1998, that recovery of the bodies was not practicable. It was not until April 2000 that a statement emerged from the Ministry that it would not be possible to safely recover the bodies. The pending October 1999 Federal elections no doubt had an influence on this.

Sadly it has to be said that the long-term interest of the families and relatives, appeared to take second place where politics were involved. The behaviour of the Minister in the Lassing tragedy should be of some concern to the people of Austria. It was not until April 2000 that a statement emerged from the Ministry that it would not be possible to recover the bodies. By then the families and relatives were well aware that the bodies would not be recovered.

Local community
The local community was led by the

Mayor and Deputy Mayor of Lassing. Lassing is a small community comprising about 500 families, which was thrust into the limelight by the disaster. People who, up until then, had had little exposure or experience in the public arena became celebrities. Due to lack of official information the press sought out anyone who could make some kind of statement. Naturally, spokespersons for the local community received full attention.

Because very little was known or understood by the community about the situation much misinformation circulated. Spurious accusations of waste material being dumped in the mine, illegal mining, management arrogance, major settlement of houses over the last 10 years, noise from blasting and so on, were all raised. Much of this was directed against the company. Personal grievances were aired and wild statements made which reflected the hysteria of the community and those around the site at the time. The underlying sentiment being suggested here was that the community had always told the company that something bad was going to happen – a premonition about which they believed the company had taken no notice.

As the months passed and the press lost interest in these accusations, anger turned towards the Mining Authority for the delay in recovering the bodies. Internal community issues also developed, particularly between those who received compensation (including the families of the dead miners) and those who had not. Lawyers also inflamed the situation by suggesting that more money could be extracted from the company.

As with the politicians, other agendas appeared to lie behind many of the actions of community representatives.

The author's observation was that, initially, it was felt by those involved in the investigation that the technical issues were too complicated for the community and general public to understand. Rather than trust in their ability to comprehend the problems they were excluded from the process. This was realised early in 1999 when the Mayor of Lassing was invited to join the weekly progress meetings held between the company, the Mining Authority and the relevant Government department representatives. The Mayor thus came to understand that recovery would be difficult and dangerous. It was also noticeable from that moment on, relatives of the deceased no longer directed their frustration at the company as they had done previously. It was also decided at that time that a representative of the

Minister meet regularly with the families to keep them informed of progress. This move was also effective until it became obvious that the Minister was still not making a public statement about recovery of the bodies. A great deal of cynicism set in and the meetings were eventually discontinued.

There is a clear message here. If up-to-date and correct information is to reach all of the affected people, foremost the relatives of the deceased and the community leaders, they must be included in the investigation process no matter how complex the issues may seem. The fact that the issues are technical and complex makes the ability to communicate them in clear, simple terms critical.

Technical experts

Austria has a typical, but seemingly more entrenched, European hierarchical cultural system. Social status is largely measured by academic qualifications. Academic positions in Universities are also highly regarded.

The situation in Austria is further exacerbated by its small mining community. The Montan University, Leoben, is the county's foremost mining school. Because of the limited mining opportunities in Austria, the University has become a 'community' which supports and promotes its graduates whose career opportunities within Austria are limited to positions at the few mines in operation, positions with the Mining Authorities and teaching positions at the University. The professors at the University are therefore in an extremely powerful position and play a significant role in the design and development of mining projects, particularly within the Leoben precinct. Such was the case at Lassing. The University had been involved in the geological studies and the development of the mining process. When the accident occurred the various professors of the University departments were called in to assist with the investigations.

There appeared to be a clear conflict of interest. The same professors who had been involved in the development of the mine were now making assessments of the cause of the accident. One professor also headed a private consulting company which was engaged to investigate the geotechnical aspects and development of rescue options, another professor was head of a research institute, while others were involved as heads of their university departments. All rely on private funding and private operations for training and teaching of undergraduates and for generation of research projects. The

Lassing accident therefore provided them with ample opportunities, regardless of who was paying the bill. Outside Europe this situation would be contained through strong and independent project management. In Austria, however, the status of the professors and their connections make control more complex. It is difficult for lower status managers and technocrats to criticise or exercise control over the higher status professors. Through the community network reputations are protected and information is passed on outside the prescribed channels.

Such was the case at Lassing, where it was very difficult for the local management and authorities to exert influence over the academics. An example of this was one professor's aim to enhance his reputation by developing an elaborate engineering solution to gain access to the mine even though his role was to examine all options. In this case, and in dealing with the other professors, the presence of non-Austrian experts and managers at Lassing greatly assisted in the way that such self-interest could be contained.

This same cultural characteristic delayed the use of state-of-the-art technology, particularly in the area geophysical investigation. The belief that 'Austrian is best' led to some inefficiency and wastage of both time and money.

Discussion

That such a tragedy occurred is unfortunate. However, tragedies keep occurring no matter how much care is taken, due either to human failing, or to some natural cause. It is therefore essential that organisations are prepared. Most developed countries have emergency management strategies with appropriate organisations ready to act with assigned responsibilities. Similar emergency plans have also been developed for businesses and relate mainly to assignment of responsibilities. What appears to be evident from the Lassing experience is that such plans stop short of dealing with some of the more obscure issues, most likely because they would differ between countries and cultures. This should however not prevent such plans being considered for all business units, even on an in-principle basis.

Research and literature regarding the impact of disasters on families, friends and communities is well documented. The phases of human reaction to disasters, including guilt, phobias, sleep disturbances, hostility and rage, anxiety, depression etc., are recognised (Laube & Murphy; Murphy & Cowan 1985; Dembert & Simmer 1999; Murphy 1986) and form

the basis for the trauma counselling process. There is also literature describing the difference in reaction between families of the deceased and friends and colleagues (Hartsough and Mileti 1985). Not surprisingly, stress levels in relatives remain higher and for a longer period than others.

There is also evidence which indicates that the older the person the greater the trauma effect (Faberow 1985) and that the effects of trauma can last up to 3 years after the tragedy (Livingston, Livingston & Fell 1994).

Specifically relevant to the company are references which demonstrate the clearly identifiable phases of anger and hostility, guilt, the need to find an explanation and the need to recover the bodies (Laube & Murphy; Murphy & Cowan 1985; Dembert & Simmer 1999; Murphy 1986).

It is noteworthy that the available research references into dealing with post disaster trauma and Post Traumatic Stress Disorder (PTSD) have focused almost entirely on the bereavement impact of the event. There are limited studies or assessments of the coping capacity of those affected as a result of harassment by the press and through manipulation by do-gooders and others with non-supportive agendas, although there are a number of publications dealing with the impact of the media. Laube and Shirley (1985) and Hobfall and de Vries (1994) acknowledge some lack of research and documentation on this issue. These authors have, to some extent, addressed the issues relating to the influence of the media and Hobfall and de Vries (1994) also address some of the issues related to interaction with the local community and the Government. They recommend ways of interacting with the Government, community and media to improve the counselling process.

A significant reference is the publication by Mathes, Gärtner & Czaplicki 1991, which is a post mortem of the mine disaster in Borken, Germany, 1988 in which 51 miners died. Six miners were rescued in dramatic fashion.

The similarity to Lassing in the nature of the disaster, the rescue and the media reaction is disturbing. There were some clear lessons to be learned and the authors presented strategies to minimise the confusion and public relations difficulties which followed the accident. These strategies are just as relevant today.

The Lassing works attempted to address the problem of external pressures through its group counselling of the workers.

There was obvious concern among the employees when, everytime something of interest at Lassing attracted the media. There was an immediate influx of press and media personnel who would aggressively chase information, with little regard to personal sensitivities. It was also noted that the court case added to the concerns of the employees and past workers as they felt a conflict between loyalty to the company and colleagues, and pressure by media, unions and families to allocate blame.

Crisis Management literature does recognise the need to have a good relationship with the media. Harrison, 1999, points out that the media are stakeholders and therefore should be included in any crisis management plan. Berge (1990) and Reid (2000) emphasise that action regarding dealings with the media needs to be taken within the first 24 hours. Berge (1990) also discusses the typical crisis after-effects such as the spread of rumours and speculation, the psychological reactions, the involvement of the media and the impact of local culture.

Although there are common consequences of disasters, Mitroff & Pearson (1993) also recognise that cultural differences are important and need to be taken into account when planning for disasters.

Bland (1998) discusses the important role lawyers can play in dealing with the media and the community. This is supported by the evidence at Lassing.

As research and experience have shown, one of the typical consequences of such a disaster is the transfer of anger towards the company. Knowing that this will occur should encourage the Company to put into place a strategy to deal with it. Such things as regular management meetings, informal discussions, plus the issue of providing factual, real information, should all contribute to minimising the anger. At Lassing the need to seek technical answers appeared to push these actions into the background.

One of the more interesting features was the reaction to the parent company sending a representative to Lassing. Initially this was considered to be an intrusion, an expression of lack of confidence and trust in local management and a potential takeover move. As time progressed it became clear that the assistance provided was an asset to the Company and the internal processes for the following reasons:
• the representative was not an Austrian and hence was not beholden to the cultural mores as indicated earlier in the paper, particularly in technical discussions with the consultants, university professors and authorities
• he had an Austrian background and knowledge of the language and culture which assisted in the establishment of trust
• the representative was seen as someone who knew what was 'actually' happening (rightly or wrongly) and hence could dispel some of the rumours and false information
• through the establishment of trust he provided a sympathetic, independent and non-threatening conduit for the Lassing employees
• he provided independent technical advice and was able to facilitate access to international experience.

What is understood from the experience at Lassing and the available literature is that the interaction and behaviour of the participants at Lassing were not unusual and followed an expected pattern. Even the cultural idiosyncrasies were foreseeable. The authors cited above all make similar recommendations regarding appropriate strategies to deal with crises. Relevant recommendations are discussed in the following section.

Conclusions and recommendations
What has been described and discussed above indicates that, in general, the 'right' things were done at Lassing by the Company. What is also clear is that things could have been done better. It would also be a pity if the sad experience of Lassing could not provide some constructive avenue to improve the process in the event of another tragedy.

Provision of psychological and psychiatric assistance is now a regular feature in Western cultures but this tends to focus on dealing with individual and community trauma and bereavement. The Lassing experience shows that other external factors can also contribute to the stress and emotion of all involved. This is slowly being recognised by research institutions and, no doubt, more will be documented in the future.

The following outlines some suggestions for ways in which any company could assist, or at least provide some defence mechanism, in ameliorating the impact of these external influences in the event of such a disaster. Some are derived from the references and others are based on the Lassing experience.
• Management in similar circumstances would do well to select an articulate spokesperson (a credible senior offi-

cer) as soon as possible after the tragedy (within 24 hours), whose main function would be to liaise with the press and community to provide timely, quality information. This would:

- shield company representatives from the press
- provide vital and up-to-date information to politicians and the press/media
- ensure that families and relatives are kept informed at all times
- combat the raft of do-gooders and people with vested interests from highjacking the process

The role of spokesperson would probably be required for at least one, maybe even two years after the tragedy given the extent and duration of the trauma experienced by relatives. Reference to the book by Mathes, Gärtner & Czaplicki (1991) for guidelines in dealing with the media is recommended.

- Inclusion of affected stakeholders at an early stage will help dispel rumour and ill feeling toward the Company.
- Research and literature on Crisis Planning and Management point to the need to have a plan in place to respond immediately to crises. Such a plan would avoid the chaos that existed on site during the hours as a crisis developed. It should include specific strategies and methods for dealing with the media, community groups and government bodies. Strategies need to take into account cultural idiosyncrasies as well as the specific nature of the operation. There is sufficient experience and knowledge, internally and externally, to enable every business to prepare a crisis plan
- Employees should be given more support in dealing with return to the workplace, exposure to the media and the pressure from relatives and community. This support needs to be available early, readily and longer. This would also include provision of up-to-date information. Such actions as regular meetings, outings, provision of special clothing etc. to foster a work community spirit are also suggested.
- Where it is acknowledged that a technical representative from outside the Company would be able to contribute by assisting with managerial responsibilities at a time of pressure, without this being seen as a threat, this should be done. Selection of an appropriate representative requires great care and would depend very much on the cultural and technical climate as well as the calibre of the person selected.

That is, the person would need to satisfy the technical, language, managerial criteria and also demonstrate empathy at all levels. A list of such persons could already be identified by the Company and updated on a regular basis.

As it takes some time to develop trust and rapport the introduction of such a person could be eased through preliminary meetings and discussions.

Such recommendations need to be incorporated into the Crisis Management Plan which has been carefully thought through before any crisis or disaster occurs.

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A new emergency management for the new millennium?

Emergency management as an international issue

It seems fitting that, at the commencement of a new millennium, an opportunity is available to reflect on developments that are shaping the social function of emergency management and the role of the emergency manager. At the same time, this opportunity enables some thought about how emergency management might develop in the near future. While thinking about future states is an important strategic exercise it is nevertheless an imprecise one: Trying to judge the future is similar to driving a car in dense fog—vague shapes are apparent, details are obscured and neither obstacles nor opportunities are precise enough to reliably act on. Moreover, while technological innovations may assist the car in its passage, these devices don't always prevent the vehicle or its occupants from coming to grief.

Nonetheless, the fact is that change in the emergency management sector is both inevitable and necessary. Natural and technological hazard impacts are continuing to trend upward in global as well as local context; and in terms of scale, frequency, and in the level of societal dislocation that is produced. Some of the hazards are well known while others are new and relatively unfamiliar. Some of the main factors contributing to the trend toward increased levels of hazard impacts, such as population growth, ageing and urbanisation, appear to continue at a relatively constant rate. Other factors, such as the utilisation of exposed high-risk regions, vulnerability of ageing urban infrastructure, environmental and climate change, may alter in a less predictable manner. In combination, these factors indicate that the task for the emergency management sector will not only be more complex but also at the same time will increasingly become central issues as communities and nations search for effective governance solutions.

What these trends illustrate is that the components of emergency management need to change from a traditional and often exclusive emergency services fraternity that is typically focused on hazard agent preparedness and response

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to a far wider consortium of agencies, skills and practices. The transition needs to expand the field to include areas such as sustainable hazard management, community resilience and risk management. This requires a shift from a deterministic orientation (which legitimises a focus on post-disaster actions like rescue, relief and reconstruction), to one that actively pursues full hazard assessment, identifies concomitant risks, and incorporates hazard reduction and emergency management knowledge directly into land-use management and urban development schemes, and other related policy areas.

In this respect, emergency management has embarked on its journey to the future. The past decade has witnessed a tremendous upsurge in efforts to deal with issues associated with the consequences of disaster. Two features in particular distinguish these efforts. The first is that these efforts have been international in both perspective and application. This is epitomised by the United Nations declaring the 1990s to be the 'international decade for natural disaster reduction' (IDNDR), followed in mid-2000, by an 'international strategy for disaster reduction' (ISDR—both IDNDR and ISDR are discussed in detail below). The second feature is that both the theory and practice of hazard reduction has been advanced. Significant insights have been gleaned as well as earlier thinking reinforced, in terms of how communities can be made safer and more resilient from the risks associated with natural and technological hazards.

At the end of the 1980s the United Nations directed attention to hazard awareness and risk management at international, regional, national and local levels of responsibility. It announced the period 1990–2000 to be the 'international decade for natural disaster reduction' (IDNDR), and hence to be a catalyst for global disaster reduction. The objective, encapsulated in UN Resolution 46/182 on 22 December 1989, was 'to reduce the loss of life, property damage and social and economic disruption caused by natural disasters through concerted international action, especially in developing countries'. Sharing experiences that would expand the use of practical measures for more effective disaster preparedness and management practices was specifically reinforced. To this end, all countries were encouraged to have in place, by the end of the 1990s, a series of fundamental outputs that would create a framework within which effective emergency management outcomes could be developed. In particular, the IDNDR encouraged countries to undertake:

- comprehensive assessment of risks from natural hazards, integrated into national development plans
- mitigation plans of practical measures to be applied at national and local levels - that would address long-term disaster prevention, preparedness, community awareness on a continuing basis
- ready access to warning systems by those people most at risk, at global, regional, national and local levels (Jeggle 1999, p.24).

As the IDNDR initiative moved into its last quarter, however, it was apparent that most countries did not have the critical building blocks that would permit these outputs to be achieved. In particular, Hays states that 'policy makers and stakeholders of all nations found:

- no legal or societal mandate from the citizens and stakeholders to evaluate existing research applications programs, plans, and public policies and to make major changes in the natural disaster reduction culture
- a lack of overall understanding of the complex inter-relations between the hazard, built, and policy environments of their nation
- a lack of technical capacity to conduct a national risk assessment

- a lack of technical capacity to develop improved monitoring, forecasting and warning systems
- a lack of political will to initiate a national mitigation strategy
- existing science, technology and traditional knowledge were not enough to effect these kinds of major changes in their natural disaster reduction culture' (Hays 1999, p.277).

On the face of it, these six factors might suggest that the IDNDR program was perhaps too ambitious or ill-conceived. A competing interpretation is that the sponsors of IDNDR were determined to ensure that progress be made in this important area; and that in order to do so underlying impediments needed to be brought to the surface so they could be dealt with. Whichever interpretation is correct, Hays' six points provide a useful list from which to demonstrate subsequent national developments; and they will be used in this way in later sections of this paper when a case study of New Zealand is presented.

There is little doubt that IDNDR was effective in encouraging nations to focus attention on the threat posed by natural hazards and in creating an environment wherein greater international collaboration was fostered. Nevertheless, the fundamental task of reducing societal consequences of disaster reduction remained. This shortcoming was acknowledged by the United Nations when, in October 2000, the Inter-Agency Task Force on Disaster Reduction stated that 'the legacy of IDNDR can be summarised as the promotion of an integrated, multi-sectoral approach to disaster reduction in the context of national development plans, rather than in the fact that the impact of disasters was reduced' (United Nations 2000, p.2). Hence, in mid-2000 the United Nations signalled its commitment to continue the task by making hazard and risk reduction a 'public value' (ISDR Secretariat 2000). To achieve this, it transposed the IDNDR Secretariat into the ISDR, the objective of which is to:

- foster multi-disciplinary and inter-sectional relationships to address the impacts of natural, technological and environmental hazards on modern societies
- shift activities and resource allocations from a predominant protection against hazards, to the management of risks
- integrate on-going risk prevention strategies into sustainable development plans by public, private and local community collaboration through partnership activities.

By shifting from a culture of reaction to hazards to one of risk management and prevention, ISDR aims to increase public awareness of hazards and risk issues for the reduction of disasters. In particular the aim is to motivate public administration policies and measures to reduce risk within a framework of sustainable development. An Inter-Agency Task Force on Disaster Reduction has been established comprising United Nations bodies, regional groupings and non-governmental organisations, supported by national governments.

These international efforts and advances in emergency management theory and practice establish the context to showcase New Zealand's recent endeavours in this field.

The evolution of emergency management

The fundamentals of conventional organised emergency management are now fifty years old. During that period, the practice of emergency management has changed from an essentially reactive and response-focused command-and-control civil defence approach, which grew out of the 1940s World War II and 1950s Korean War eras, to a more comprehensive and integrated approach instigated during the late 1970s. The changing hazard environment and attempts to bring practice into line during the 1970s produced the Comprehensive Emergency Management (CEM) approach, and brought forth the 'emergency manager', a specific administrator/practitioner who devoted most of his or her time to 'emergency management' (Britton 1989, 1992, 1999; Dynes 1990; Perry 1985). CEM referred to the responsibility and capability of a political component (nation, state, and local area) to manage all types of emergencies and disasters by coordinating the actions of all relevant players. The 'comprehensive' aspect includes hazard mitigation (or risk reduction), preparedness (readiness), response and recovery.

Stemming from this came the Integrated Emergency Management System (IEMS), which would help form partnerships between the different levels of resource owners, both vertically (between levels of government) and horizontally (between different agencies and the public-private sector). Basically a process model, IEMS focused attention to hazard analysis, capability assessment, emergency planning, capacity maintenance, and emergency response and recovery requirements. However, while CEM/IEMS dominated emergency management

thinking for the next two decades, the practical application lagged. Even though some notable successes have occurred in bringing theory and practice together, there is still a lack of integration between hazard mitigation and emergency response.

The 1990s witnessed a different set of imperatives that started to make demands on, and necessitated a re-evaluation of, the role and direction of emergency management. Two imperatives strongly influencing political thinking in most countries are sustainable development and the heightened public demand for increased safety. In this respect, disasters have started to become a policy problem of global proportion precisely because of the growing realisation and acceptance that what humans do both in the normal course of their lives and in response to disasters frequently magnify the vulnerability of communities.

In essence, there has been widespread failure to recognise and address connections between changes in land use, settlement policies, population distributions and the accompanying degradation of habitats on the one hand, and dramatically increased levels of hazard exposure and vulnerability on the other. Hewitt summed this up well as early as 1983 when he stated that:

> the causes, nature and consequences of natural disaster depend not on conditions or behaviours peculiar to calamitous events but on the ongoing social order, its everyday relations to the habitat and the larger historical circumstances that shape or frustrate these matters (Hewitt 1983, p.25).

With this understanding starting to take root globally as well as locally, emergency management is once again transforming itself. It is moving from an operationally focused impact response activity into one that is incorporating these tasks into a more encompassing risk management framework. This broader approach places emergency management in the overall context of a community's economic and social activities. Steps taken to manage risks of extreme events can be justified to the extent that they deliver a net benefit to society. Attempts to manage risks, however, will invariably impose costs as well as benefits. Hence, the social function of emergency management is shifting from one that only minimises losses (for example, reducing loss of life or property damage), but also maximises gains (such as supporting sound investment decision-making, and general community well being).

In the process, emergency management is re-engaging with traditional partners and establishing its credentials with new associates. Perhaps the most important transforming component to emerge from the past decade is the realisation that the management of hazards and the emergencies that can stem from them cannot be achieved in isolation. To be effective, hazard and emergency management practices must be integrated into the wider regimen of practices, processes and structures of the community.

Linked to this, is the wide acceptance of the idea that emergency management requires specialised knowledge, skills and training (Mileti 1999, pp.228-9). Even a brief listing on the diversity of specialisms that emergency management looks toward illustrates why the need exists. Emergency management needs to utilise disciplines such as anthropology, climatology, demography, economics, engineering, geography, geology, law, meteorology, organisation studies, planning, political science and public policy, psychology, seismology and sociology. Professionals in these and other fields have continued to investigate how engineering projects, warning systems, land use management, planning for response and recovery, insurance, and building codes can help individuals and communities adapt to natural and technological hazards. These same groups have also assisted in reducing the resulting deaths, injuries, social and psychological costs as well as environmental and economic disruption.

This acceptance has encouraged a marked increase in activities leading to the process of professionalisation within emergency management. It has been accompanied by the formation of organisations and associations concerned with the training of and awarding of credentials to emergency management specialists, the development of specialised publications, and the spread of professional meetings and training (Mileti 1999).

From emergency to management

Another emerging characteristic is the shift from role specificity to a wider collection of tasks that brings together many roles. Today's emergency managers are being called upon to tackle problems they have never before confronted, such as understanding complex physical and social systems, conducting sophisticated cost-benefit analyses, and offering long-term solutions (Mileti 1999, p.13). With this as the new reality, there is a growing awareness that the term 'emergency

manager' is perhaps less a specific position than a collection of positions encompassing areas as diverse as city governance, community development, emergency response, insurance, land-use management, legislation, urban development, and urban planning.

A key factor in this new thinking is the concentration on the 'management' component rather than the 'emergency'. This has widened the focus of emergency management from being highly task-specific (that is planning and responding to particular categories of events by engaging dedicated skilled personnel and resources) to a more generic social function looking at mass emergency and

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disaster from a holistic perspective. This, in turn, directs attention to integration as a central concept.

In this context, management relates to relationships (people as well as organisations), resources (how one's own as well as the wider community resources are utilised), and the environment (sustainable development as well as hazard suppression), regardless of whether a hazard threatens or has impacted. This approach is broadening out the domain of emergency management, and while the specific context—to deal with disruptions of entire communities by a natural or technological hazard-has its own characteristics and will always be needed, the approach is changing. The change in emphasis has introduced new dimensions requiring a wider range of practices and processes than any single occupational group can master. It reflects the broadening of emergency

management's mandate from response to include reduction, from hazard profiling to include a complimentary understanding of community attributes, and from impact event to include the impact consequences.

None of these developments, however, imply that the destruction and suffering imposed by disasters will be easily eliminated.

There will always be the need for plans to address these aspects of reality. The real issue is to bring disaster response planning and operations into a more holistic policy and practice framework. Sustainable hazard management, at this point in time at least, appears the most appropriate vehicle to achieve this.

Creating community sustainability and resilience

A prime initiative for greater connections to be made between hazard mitigation, emergency management and sustainable development is the work of Mileti and his associates (see for example, Mileti 1997, 1999a, 1999b, 1999c; Beavers and Mileti 2000). In this context sustainable and resilient communities can be defined as societies which are structurally organised to avoid or minimise the effects of disasters, and, at the same time, have the ability to recover quickly by restoring the socio-economic vitality of the community (Tobin 1999, p.13):

To achieve sustainability, communities must take responsibility for choosing where and how development proceeds. Towards that end, each locality evaluates its environmental resources and hazards, chooses future losses that it is willing to bear, and ensures that development and other community actions and polices adhere to those goals.

A sustainable community also selects hazard reduction and management strategies that evolve from full participation among all public and private stakeholders (Mileti 1999a, p.4).

Planning is probably the most comprehensive means of creating sustainability and resilience. Sustainable development is the result of an integral planning process that incorporates (or should incorporate) a number of considerations regarding hazards such as vulnerability and risk reduction, strategies aimed at protecting the environment, and economic growth. Hence, implementing hazard mitigation policies is a major vehicle, although it is not the only means, and neither will it work in all cases. It is not a comprehensive plan per se that is needed, but rather a comprehensive policy that will be the most successful.

Such a policy would incorporate elements of land use management, construction regulations and perhaps financial inducements or sanctions. Whatever the specific components might be, and these will vary from country to country, two essential inter-linked components are strategies to promote cooperation among all stakeholders and a whole-of-government approach.

Mileti suggests a series of objectives that need to be simultaneously achieved if hazards can be managed in a sustainable way:

* *Maintain and enhance environmental quality:* human activities to mitigate hazards should not reduce the carrying capacity of the ecosystem, for doing so increases the losses from hazards in the longer term.
* *Maintain and enhance people's quality of life:* a population's quality of life includes, among other factors, access to income, education, health care, housing and employment, as well as protection from disaster. To become sustainable, local communities must consciously define the quality of life they want and select only those mitigation strategies that do not detract from any aspect of that vision.
* *Foster local resilience and responsibility:* resilience to disasters means a locality can withstand an extreme natural event with a tolerable level of losses. It takes mitigation actions consistent with achieving that level of protection.
* *Recognise that vibrant local communities are essential:* communities should take mitigation actions that foster a strong local economy rather than detract from one.
* *Ensure inter- and intra-generational equity:* a sustainable community selects mitigation activities that reduce hazards across all ethnic, racial and income groups and between genders equally, now and in the future. The costs of today's advances are not shifted onto later generations or less powerful groups.
* *Adopt local consensus building:* a sustainable community selects mitigation strategies that evolve from full participation among all public and private stakeholders. The participatory process itself may be as important as the outcome (Mileti 1999a, pp.5-6).

Mileti also suggests that within the sustainability context, a good comprehensive hazard management planning framework would contain the following:
* *Hazard identification:* magnitude, location, and probability of a disaster

* *Impact assessment:* what populations and properties are exposed to hazards, and the likely damage in a disaster
* *Loss estimation:* the quantitative probability of damage, injuries, and cost in a given area over a specified period of time
* *Carrying-capacity assessment:* the maximum load (population x per capita impact) that can safely and persistently be imposed on the local environment by society without reducing the ability of the environment to support such a community in the future
* *Built-out analysis:* the maximum level for the buildings and infrastructure given the character of the local social and environmental systems
* *Ecological footprint analysis:* an estimate of the land and water area needed to support local consumption and development practices
* *Assessment of sustainability indicators:* many communities have identified indicators such as education, the economy, public safety, the natural environment, health, the social environment, politics, culture, and mobility
* *Environmental impact statement:* such a statement should always include an analysis of natural hazards (Mileti 1999a, p.156)

How these components might be implemented, how their effectiveness evaluated, and if lists such as these are sufficiently comprehensive, has yet to be determined. This is the task ahead and where emphasis is now starting to be placed. As these initiatives take hold, emergency management will be pulled further—and faster—along an evolutionary path, and will be pushed further—and faster—from its response-only origin.

Drivers for change

Emergency management is invariably influenced by broader social change. Six key drivers that are altering the ways in which individuals as well as institutions frame perspectives and subsequent action can be identified (see *table 1, overleaf*). These drivers will help to embed emergency management into the everyday decision-making within communities.

The drivers present a framework within which emergency management can operate (*Figure 1*). Here, the overall aim of emergency management is to enable communities to maximise gains (through sustainable hazard management) and minimise losses (through effective risk reduction, response and recovery programs).

The drivers for these actions are sustainability and resilience; holistic, integrated management; governance and partnerships; and economic efficiency. Both central and local governments as well as the private and non-governmental sectors have roles to play—but they need to be coordinated.

To achieve the wider aim, a community's social and economic goals need to be articulated. This is a prerequisite for any strategic planning so that, through a risk management process (depicted in *Figure 2, overleaf*), community choices can be made about levels of risk commensurate to the wider goals of the community.

Tensions will exist between different drivers, and should be expected. For instance, at times decisions promoting intra- and inter-generational equity, may not always be economically efficient, and vice versa.

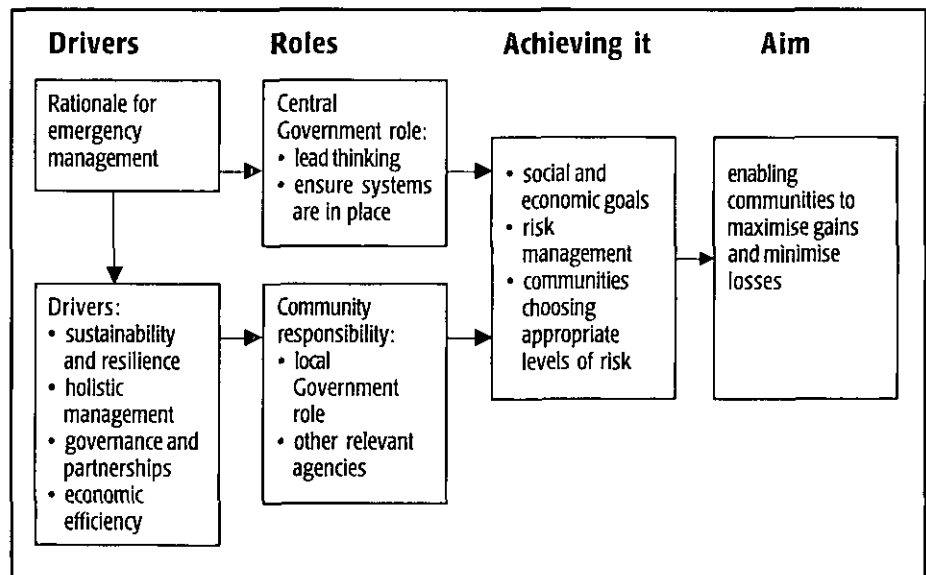This does not mean that the drivers themselves are flawed. Rather, they provide

Figure 1: Emergency management drivers.

Sustainability	Since the release of the Brundtland Report in 1987, sustainable development has become an entrenched concept within most developed countries. In the emergency management context a sustainable approach should ensure that decisions about economic and social development do not inadvertently increase the risks from social harms to current or future generations. This does not mean that risk exposure in some instances will not increase. However, where it does, it should only be through explicit consideration.
Resilience	Resilience concerns the ability of systems to absorb change and to either bounce back, or to shift to new points of stability. For emergency management this means focusing more effort on reducing the vulnerability of a community to 'extraordinary' events. It also requires more emphasis on planning for, and undertaking, post-event recovery in order to make communities less vulnerable to future events. The key to effective community resilience lies within broader economic and social policies.
Integrated management	Both concepts above underpin the need for holistic decision-making. This means embedding emergency management thinking within all decision-making affecting the wider social and economic goals of communities, so that emergency management becomes an integral part of achieving the goals (rather than an obstacle or as is often the case, an unknown). Equally important is that reducing a community's vulnerability to one hazard should not inadvertently increase its vulnerability elsewhere
Governance	Many everyday decisions add to or lessen the vulnerability of communities. These decisions are often made within the public domain or, at least, are influenced by decisions made within the public domain. To be successful, emergency management must be accepted as a core part of governance within public institutions and, wherever possible, private institutions as well. Consistent with a risk management approach, decisions should be made following wide consultation and the establishing of a clear mandate, and by representatives at all levels of government. Importantly, national aspects of emergency management should be dealt with in a way that allows decisions affecting individual communities to be made locally. This ownership of decisions should lead to better outcomes by being pragmatic and by being understood by those affected, and thereby strengthening a community's resolve about them.
Partnerships	Emergency management cuts across all sorts of activities both nationally and locally. Effective partnerships must be created and maintained horizontally (between government, private sector interests and community groups), and vertically (between different levels of government, and private and voluntary sector organisations). The linkages and relationships that are required throughout the wider community to achieve effective emergency management are significant. However, many emergency management agencies have difficulty in gaining acceptance among other agencies that are influential in the adoption of a risk-based approach to disaster management. This is primarily due to the continuing misconception, by both the public and other agencies, that emergency management is solely about preparing for and responding to events. It is therefore important that wider interests are signalled, and that those working in the field of emergency management strengthen and unify existing partnerships, as well as forge new ones.
Economic Efficiency	It almost goes without saying that any public policy developed nowadays must be economically efficient; this prerequisite will not diminish with time. For emergency management this requires consideration of many issues including transaction costs, incentives for appropriate behaviour, moral hazard issues, and least-cost policy tools. Paying for effective risk-based emergency management programs will require governments to tighten up on some disaster practices that are inconsistent with other policy decisions.

Table 1: Drivers for emergency management. Source: Ministry for Emergency Management (1999a).

Type	Location	Exposed population
Floods	Most inhabited areas	2.6 million
Volcanoes	Auckland area and central North Island	2.2 million
Earthquakes	Central areas of New Zealand	2 million

NB. Total population in 2000 is 3.8 million

Source: Tephra (1994) 13(1) May p.10 (revised - Britton, 1998)

Table 2: Principal natural hazards in New Zealand.

contexts within which trade-offs can be made that, as far as possible, balance the meeting of different needs and expectations within society as a whole.

The challenge still remains for the development of practical mechanisms to implement these drivers. If it becomes a routine function, emergency management can assist communities to achieve wider goals.

Making progress: a New Zealand case study

Engaging these drivers to enable emergency management to keep pace with wider social change and consolidate its utility will require significant groundwork. Hays (1999) work, cited earlier, reminds us that developing critical building blocks is an essential prerequisite if substantial progress is to be made in national natural disaster reduction programs. The six prerequisites Hays identified can be grouped into four generic areas:

- creating a mandate for change
- emergency and hazard management as politically salient issues
- developing appropriate levels of understanding
- creating the necessary technical capacity.

Using these four areas as guides, we now turn to illustrate how New Zealand is underpinning its own emergency management reform by addressing these fundamentals.

Creating a mandate for change

While the potential for large-scale natural hazard impact in New Zealand is readily

apparent (see for example, *Table 2*), and a number of hazard incidents provide constant reminders (*Table 3*), the nation has been fortunate in not having a major natural disaster since the 1931 Napier earthquake. Not surprisingly, the New Zealand population became accustomed to the idea that the emergency system and attendant practices and processes, largely untouched for decades, were nevertheless satisfactory. The prevailing attitude amongst citizens, practitioners and politicians was 'if it ain't broke then why fix it?'

Events elsewhere, and in particular the 1989 Loma Prieta earthquake in California (in which a combined local and central government emergency management team visited shortly after impact), started to jolt this complacency. The early and mid-1990s produced a number of reviews, reports and workshops that highlighted a series of issues that began to question the effectiveness of New Zealand's emergency management practice. For instance, a Law Commission Report (1991) identified changes needed in executive powers that were necessary to deal effectively with a national emergency. The Law Commission also indicated that a review of the current legislation would be appropriate. In like manner, in 1991 a major study of how utility lifelines would perform following a maximum credible earthquake in the Wellington region, the first of its type in New Zealand, revealed a series of significant vulnerabilities that had not hitherto been considered (CAE 1991).

In similar fashion, a 1992 review of civil defence practices linked social and economic changes and public sector reform that had occurred since the
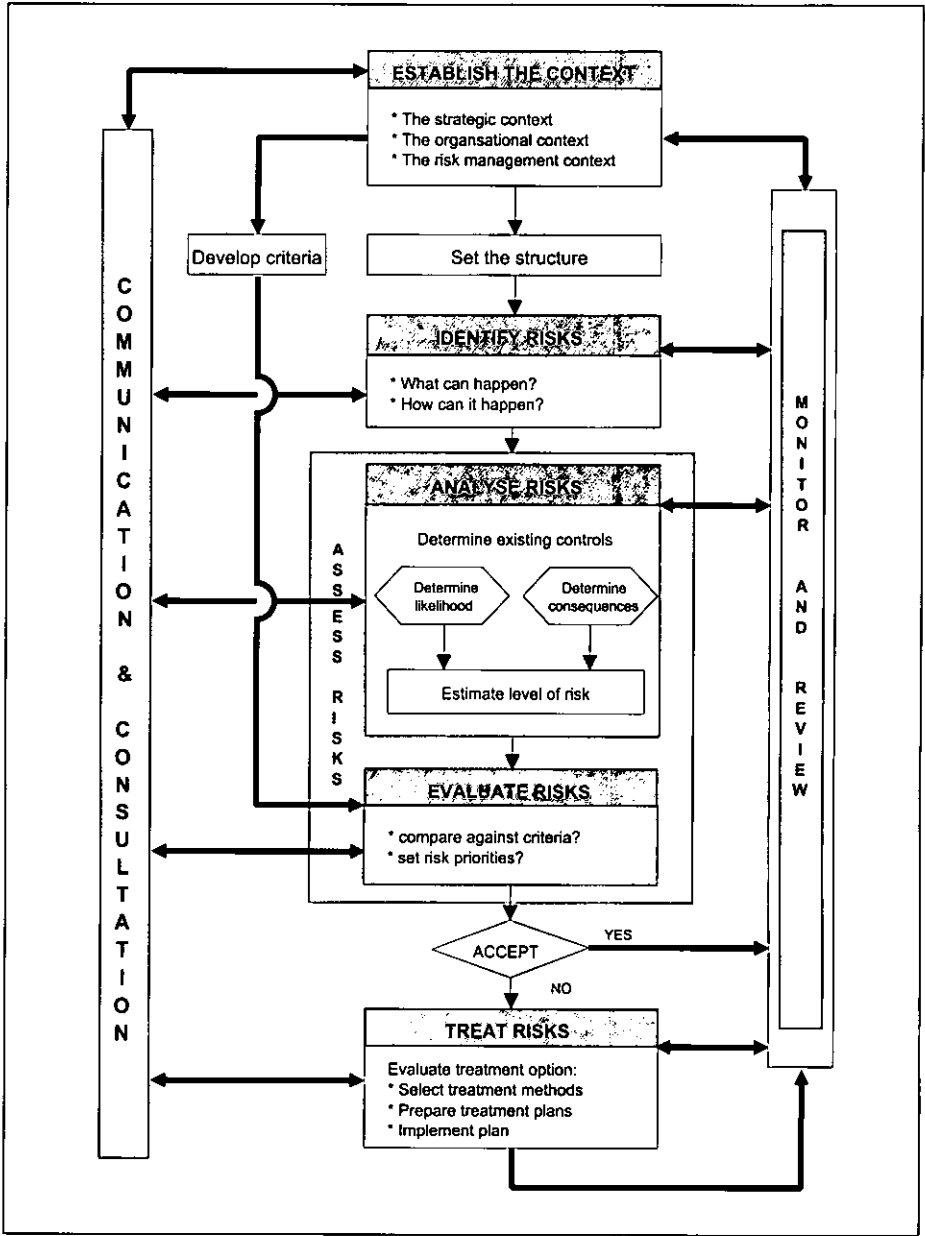
Figure 2: The risk management process. *Source: Standards Australia. (1999) Risk Management Standard. AS/NZS 4360:1999 2nd Edition. Joint Australian/New Zealand Standard prepared by the Joint Technical Committee OB/. Strathfield, NSW: Standards Association of Australia.*

Event	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Alerts	-	-	-	4	-	-	-	-	-	-
Heavy rain warnings	63	112	74	75	94	89	84	117	123	99
Snow warnings	-	35	8	12	16	25	16	5	16	5
Strong wind warnings	4	22	14	18	8	22	32	50	22	16
Tornadoes/cyclones	4	1	-	-	1	2	1	4	1	-
Felt earthquakes	42	47	73	50	46	63	69	82	106	172
Tsunami bulletins	9	12	13	16	41	32	22	14	15	11
Floods (non-declared)	-	4	1	2	8	2	-	11	1	4
Volcanic incidents	-	1	-	1	4	6	9	8	12	11
Other incidents	1	2	3	-	-	3	1	1	2	-
Total	169	243	201	194	221	259	251	309	316	327
Declared emergencies	3	1	1	9	3	3	3	6	7	

Table 3: Natural Hazard Incidents—1991 to 2000 (up to 21 November 2000). Year from 1 July to 30 June   Source: National Operations statistics, Ministry for Emergency Management

passing of the Civil Defence Act 1983 with the nation's capacity to respond to a national natural disaster. This review found that the wider reforms had 'dislocated much of the current Act from modern realities' (Civil Defence Review Panel 1992), and concluded that existing structures would not cope in a major civil emergency.

Two years later, the lessons of the 1994 earthquake in Northridge, California, were explored in two Wellington conferences. The first, organised in May 1994 by Wellington City Council and the New Zealand Fire Service, brought key Los Angeles emergency managers to Wellington: their experiences quickly revealed many weaknesses inherent in the local system. The second meeting, organised by the Wellington Earthquake Lifelines Group in November 1994, illustrated among other things a greater need to concentrate on developing coordination between the utilities and the emergency services (WeLG 1994).

By this time, the consistency of messages was starting to take effect. In late 1994, the Minister of Internal Affairs invited twenty-six emergency-relevant organisations to attend a workshop and explore issues pertaining to the current performance of the emergency services sector and to generate ideas on how this could be improved in both the short and long terms.

The workshop proposed to Government that a comprehensive review of emergency services be undertaken. Subsequently, in April 1995 Cabinet appointed a five-member Task Force to undertake a Review of Emergency Services (1995). The terms of reference, however, identified preparation and first response capability as the priority of the review. This was tempered to a degree when the Minister of Finance commissioned a Review of Disaster Recovery Preparedness (1996 1997) with particular reference to issues pertaining to the private sector.

Through its deliberations, the Emergency Services Review Task Force confirmed the existence of a consensus on the need for change. Three factors in particular were identified that focused this need:
- there were unrealistically high public expectations of assistance that could be provided in an emergency
- there was a reduced capacity of central and local government to respond following public sector reform
- there was a need to improve the ability of the emergency services sector to

adapt to changing circumstances, learn from overseas experience, and to better coordinate resources.

The task force recommended to Government a new structure comprising a Ministry with policy, purchase and audit functions and an operational structure to deal with emergency response that would integrate local and central government emergency service providers.

The task force also recommended that the nation's emergency management system should be more comprehensive in outlook and approach, rather than maintaining an avowedly response-focused orientation. It also suggested that the sector needed to move quicker and farther in

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areas of professional development; and it reinforced the established practice that accountability for declarations of emergency should remain the task of elected officials at the most appropriate level of government. These recommendations were endorsed and extended by an Officials Committee that was established to comment on the report.

The findings of the task force, and its recommendation for a new approach to emergency management were reported in local and national media. Workshops for key sectors (including local government, emergency services, the voluntary sector, the research community and professional associations) were held in Wellington during late 1996. Once Government agreed in principle to the recommendations, a series of eighteen workshops was held throughout the country in 1997 to explain and explore with stakeholders how a proposed new emergency management system might function.

Once a new Ministry had been created

in 1999 to carry the reforms forward, and prior to the advent of a Bill being introduced into Parliament to replace the current legislation, another series of workshops were held throughout the country in late 2000. The focus this time was providing information and guidance about proposed new practices, processes and structures.

The need for change has been generally accepted and several stakeholder groups are moving ahead of the legislation (which was introduced into Parliament in November 2000) to re-configure practices, processes and structures. In particular, the vision of emergency management being able to assist communities achieve wider goals has been embraced. Here, the risk management approach recommended by Standards Australia and Standards New Zealand has proved to be an invaluable guide.

Emergency and hazard management as politically salient issues

One of the aims of emergency management reform in New Zealand is to link this area with other community values and make it part of a community's overall strategic approach to the future. The reform aims to tie emergency management to community decisions about growth, development, and long-term sustainability. In essence, the New Zealand approach is to make emergency management an integral part of management and governance systems (MEM 1999a; 1999d).

A significant step along this road was reached in 1997 when both Central Government and local governments formally acknowledged emergency management to be a core function of their respective governance systems. In the case of Central Government it also re-defined its responsibility to that of establishing the emergency management framework and identifying the principles, roles and responsibilities of all agencies in the sector.

The cornerstone of the new emergency management framework is a set of principles that are fundamental guides to policy actions:
- emergency management to be comprehensive and integrated
- emergency management must focus on the consequences of all hazards
- emergency management must be supported by appropriate information, expertise and structures
- emergency management must provide for consequences that are beyond the capacity of people and communities
- emergency management requires a

systematic approach (including risk management)
• emergency management requires community participation.

The means for institutionalising these principles are the basis for the proposed new legislation and a national strategy for emergency management. The Bill, intended to repeal the existing Act, provides for planning and preparation for emergencies, as well as for response and recovery in the event of an emergency. A general policy statement contained within the Bill asserts its intention is to improve and promote 'the sustainable management of hazards in a way that contributes to the well-being and safety of the public and property'. In particular, the Bill is designed to:
• ensure New Zealand has the appropriate structures and expertise to manage disasters at the local and national level
• ensure New Zealand implements a risk management approach to hazards across the board
• ensure New Zealand communities actively seek to reduce the risks they are exposed to as well as being prepared to respond effectively to events when they happen
• provide the framework for greater cooperation and coordination of emergency management amongst local government, national government and emergency services
• reduce the risk of adverse economic and social impacts from emergencies (New Zealand Government 2000, p.1).

Apart from establishing new structures and roles, the Bill has the capacity to influence land-use planning and infrastructure management, two aspects identified elsewhere as being critical to effective hazard and emergency management (May et al. 1996; Britton 1993; Britton and Clark 1999a, 1999b). The Bill also requires the development, via a consultative process, of a national strategy, which will provide overall strategic direction for emergency management. Centred upon the concept of resiliency, the national strategy is designed to:
• identify national interests and priorities for sustainable hazard management to guide decision-making both nationally and locally
• assist in the clarification and coordination of roles, responsibilities, and expectations or people, businesses, communities and public agencies
• outline targets, actions and themes at aligning policy development and ensuring efficient, effective and coordinated program implementation.

Since the scientific literature is replete with examples and explanations about why emergency management has low salience among public officials and the general public, and is a major impediment to effective policy making, the across-the-board commitment to the initiatives described above in New Zealand is particularly pleasing. This is even more the case when these reforms, are taking place without a major natural disaster. This factor alone underscores the relatively high salience that emergency management is achieving in the country. Moreover, the absence of a major precipitating event has allowed New Zealand to develop a system that has not been sidetracked by the urgency imposed by any specific disaster event.

Developing appropriate levels of understanding

Developing a level of understanding about hazards, the associated risk and their management that is sufficient to make substantial progress is not an easy task. A lot of 'unlearning' has to occur at every level of society, and for this to occur there has to be commitment. If commitment exists for solving the problem, many hazard and emergency management issues can be addressed within existing tools and information. After all, as Mileti reminds us, disaster-resilient communities are built with the same building blocks that create resiliency to other social and environmental problems. However:

> until people are ready to address the inter-dependent root causes of disasters and to do the difficult work of coming to negotiated consensus about which losses are acceptable, which are unacceptable, and what type of action to take, communities will continue a path toward ever-larger natural disasters (Mileti 1999a, p.64).

Part of the unlearning process requires people to be comfortable with shifting from 'disasters as acts of god' to 'disasters as acts of human intervention' (Britton 1986; Quarantelli 1998). If, and when this can be overcome, Perry and Lindell remind us that developing effective hazard management programs is dependent upon adequate awareness of a series of inter-related issues:

> To develop a natural hazards mitigation program, both citizens and officials of a community need to be aware that hazards exist and believe that a risk of significant negative consequences is posed. At the same

time, officials need to believe that there are effective ways for coping with the hazards. In addition, the policy programs being suggested must be politically feasible to implement, which means that they are compatible with community values (Perry and Lindell 1982, p.30).

In both areas closer linkages between the practitioner and researcher, as well as between different research disciplines will substantially aid the re-learning process. The need for continued inter-disciplinary and crosscutting partnership building at all levels among scientific and social organisations, government, and the private sector is paramount.

Taking New Zealand as an example (although the issue is by no means unique to this country—see Haimes 1999; Irwin 1995), there are significant gaps between research and practice as well as between different areas of specialist disciplines. Both areas are creating barriers to greater development and application. Acknowledging this, the Ministry for Emergency Management is undertaking a strategy for research designed to meet Government's goals for emergency management, and that also fits with general policies and practices in the nation's research sector (MEM 2000a).

The research strategy seeks to gain agreement from relevant research providers to create a vision for research on emergency management; to establish a set of principles for research relevant to the field, and to identify key tasks needed to implement the vision and principles. This is necessary because, in effect, Government reforms in emergency management have identified gaps in relevant research programs. In particular, there is a:
• lack of comprehensive coverage of research on all aspects relevant to risk-based emergency management, for instance, disciplines such as earth sciences and engineering tend to receive a strong focus, while behavioural sciences, public policy and related areas receive less attention
• insufficient 'national perspective' on hazards, risks and consequences, making it difficult for policy-makers to gauge the risks the nation is subject to, or to measure progress on the management of those risks
• insufficient linkages between different 'emergency management' research sectors—for instance between those involved in research on economic effects, and those involved in research on physical processes

• research is not always focused on application for communities or practical use:
  • decisions on research not driven by end-users
  • presentation of research not user-friendly
  • research does not always reach the appropriate end-users (MEM 1999b, p.8).

The Ministry is currently working with providers and users of emergency management research to identify research (and the capability to do research) in place, and where there are gaps.

A key component of this is the adoption of risk management (Joint Technical Committee 1999; MEM 1999b). A broad approach to risk management places emergency management in the overall context of a community's economic and social activities (Mattingly 1999). The risk management approach is increasingly being seen as a process in which the public at large in New Zealand openly evaluates risk reduction. The logical long-term outcome of this new approach will be the development of communities that are more disaster resistant.

Creating the necessary technical capacity

Emergency management is a coordination task, not a directive one. Skills and expertise, resources, and political authority have to be brought together to assure effective hazard mitigation, disaster response and appropriate recovery so as to achieve sustainable hazard management and community resilience. These programs need to be negotiated rather than mandated; and in this context hierarchical relationships need to be based on inter-personal reciprocity if they are going to be effective.

This approach is particularly important for emergency management since there is no one agency with the requisite technical and administrative expertise to perform all the needed functions. While there is some organisational overlap (and some gaps), emergency management involves response agencies; scientific and technical agencies; regulatory and mitigation agencies; education agencies; support agencies; coordination agencies; and responsible personnel from both private and public sectors. A major challenge for emergency managers is to provide sufficient coordination of involved agencies so that the responsible officials can make the necessary decisions across the CEM/IEMS spectrum.

New Zealand is well served by a range of statutes that have managing the effects of hazards (and managing specialist emergency events) built-in, notably in the resource management, building, bio-security, new organisms and hazardous substances areas. These statutes have a similar style, in terms of their purpose and policy development (planning) processes, in that they:
• have sustainable management (of the environment, and/or the health and safety, and economic and social well-being of people) as part of their general purposes
• aim at avoiding, mitigating and reme-dying adverse effects of activities (land-uses, hazardous substances storage,

Integrated pre-disaster planning for post-event recovery is a relatively new concept that has the potential to help communities reduce hazard threats, to recover quicker, and achieve greater resilience from undesired disruption.

etc.) simply through performance standards rather than prescribing exact means of doing so (MEM 1999b).

This suite also establishes holistic policy development methodologies (are cross-media, territory-wide, and cover all industries and like activities), require justification of policies and methods of implementation (they must consider alternatives, assess benefits and costs), and link costs (of administration activities and service delivery) to beneficiaries or exacerbators (such as polluters) by equitable and efficient means. Other legislation has similar useful requirements. For example, core local government legislation (covering the provision of public works and community services associated with risk reduction and preparedness) requires local authorities to rigorously evaluate what works and services to deliver, and how best to deliver them.

While the above points offer positive opportunities for emergency management, some issues do exist. Better information gathering and analysis methodologies, and a higher and more diversified skill levels available to core agencies are two areas in particular that have been identified that require prompt attention.

To achieve these ends, the Ministry is leading efforts to better coordinate and integrate the strategies, policies and programs of relevant public and private agencies. One example is a strategy to enhance professional development across local government and emergency services. Specifically, the strategy aims to identify what knowledge, skills and behaviours are required of emergency management practitioners; to formalise and align education and training standards and qualifications; and to improve the inter-agency cooperation in the delivery of relevant programs (MEM 1999b; 2000b). The standardised programs are being developed, to NZ Qualifications Frame-work requirements where applicable, in cooperation with a number of tertiary educational providers.

Consistent with its role of establishing and maintaining the emergency management framework for New Zealand, central government also approved a model for the delivery of emergency management at the local level.

The model has been developed in conjunction with local government to ensure that it has practical application and is flexible enough to be implemented in a wide number of contexts. The model comprises consortia of existing local authorities, working with emergency services, utilities and other relevant resource holders to oversee risk-based emergency management for their area. Publications providing information to the consortia for planning arrangements (MEM 2000c) and the formation of appropriate structures (MEM 2000d) have been prepared by the Ministry, with others for utilities and the health services underway.

More specialised information is also being prepared on the roles of agencies and statutory processes for managing specific hazards in a wider context, for example flooding as part of 'whole of catchment' river management (MEM 2000e).

Linked to these initiatives is a monitoring and evaluation strategy. While still in the development stage, the strategy will underpin a range of work, for example, to develop social and economic indicators to provide insights into community resilience;

and assist in the identification of 'best practice' approaches among agencies.

All these strategies and work programs are aimed at helping key stakeholders identify, understand and perform their roles for creating community sustainability and resilience.

By institutionalising best practice approaches and providing relevant education and training programs, the overall capacity of the emergency management sector will be increased. A key emphasis throughout is on coordination. To this end, two key functions of the Ministry are facilitation (by developing frameworks and programs) and brokering (bringing key personnel together and negotiating roles). Creating opportunities to link person-to-person; specialist-to-specialist; agency-to-agency; and sector-to-sector is perhaps the most important role of the Ministry.

Conclusion

Integrated pre-disaster planning for post-event recovery is a relatively new concept that has the potential to help communities reduce hazard threats, to recover quicker, and achieve greater resilience from undesired disruption. It does, however require further development.

The successful utilisation of this concept requires a complete shift from the deterministic act-of-god perception to one in which communities take full responsibility for the implications of their planning decisions. Adopting land-use management practices that are in harmony with the physical locality which at the same time meet the expectations and desires of communities are fundamental prerequisites.

The need to be more forward thinking by developing policy instruments that can institutionalise hazard management and motivate communities to achieve greater robustness are also required. New organisational relationships and new ways of bringing together different technical skills also become both necessary and possible, as the functions of hazard reduction and emergency management are recognised as being multi-dimensional, involving many skills and abilities.

The evidence is now abundantly clear that natural and technological disasters are not problems that can be solved in isolation: 'Losses from hazards result from short-sighted and narrow conceptions of the relationships of humans to the natural environment' (Beavers, Mileti and Peek 2000, p.65). With this understanding, emergency management practice is beginning to re-invent itself to deliver services that will best meet the needs of communities.

This is not an easy task. Emergency management exists within a complex political, economic and social environment. Designing and implementing relevant practices and processes is easier said than done. While the reasons are myriad, three longstanding obstacles have been the low salience of disaster issues; the vertical and horizontal fragmentation of governance systems (and in particular the relative lack of adequate linkages between public and private sectors one the one hand, and the research and practitioner communities on the other); and the technical problems in identifying hazards, defining risk, designing and implementing mitigation programs, as well as preparing for, responding to and recovering from impacts.

These issues are now being tackled with more determination than they have been in the past. Helping this is the recognition that community expectations are changing. There is more expectation of public participation and more need for consensus-building regarding hazards and risk reduction. However, this recognition comes at a time when there are fewer resources available to support broadly focused and potentially expensive programs that may or may not be needed in the (political) lifetime of decision-makers.

The fact that emergency management is an issue necessitating an integrative approach is also becoming more widely understood. Petak has suggested that effective emergency management practice require governance systems to possess four interlocking mechanisms.

They are the capability to understand the total system, the uses to which the products of the efforts of various professionals will be put, the potential linkages between the activities of various professional specialists, and the specifications for output and language which are compatible with the needs and understanding of others within the total system (Petak 1985, p.6). These four elements are the basic organising principles of the emerging emergency management framework that is emerging out of the twentieth century.

While these developments do not mean that our communities are adequately prepared to deal with disasters, there is nevertheless cause for optimism as this new framework is slowly being put in place. Emergency management is starting to become a politically salient issue before impact occurs. This is a major turnaround and suggests that decision-makers are beginning to regard emergency management as they would many other major social issues.

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The operational debrief process

Background

A few months ago I had a call from a Risk Engineer who told me that he has been invited to an operational debrief. This operational debrief was conducted after a major emergency event in a large city. This risk engineer was rather reticent and did not wish to mention the event or his hosts, but he expressed dismay at the process that he observed and asked me if it was an anomaly or typical. His reaction caused me to reflect on the operational debriefings that I had either been part of, or just witnessed. My conclusion was that most of the ones I had been part of or just witnessed, had been less than satisfactory. But it was not the fault of the people conducting the 'debrief' it is an area of training and education that has been neglected.

There are a number of briefing processes such as the military model, SMEAC where the basis of the briefing is the Situation, the Mission, the Execution, the Administration and the Communications but I am not aware of a structure for the debriefing process.

I do want to emphasise that in this paper I am not talking about Critical Incident Stress Management and Critical Incident Stress Debriefing and Defusing. They are very important concepts and ones that have been well researched and documented over the last ten years.

It is the multi-organisational or single agency Operational Debriefing process that I wish to have debated.

But prior to considering the Operational Debriefing process it is appropriate to consider the Operational Briefing Process which many organisations will claim to use.

Operational briefing

Rasmussen and Jensen (1998) wrote the Coordinated Incident Management system (CIMS) Project which has been adopted in New Zealand. In the CIMS project it is stressed that the management of an incident needs an objective and a desired outcome to be identified and communicated, this is the rationale behind the Operational Briefing Process.

A briefing using the SMEAC concept could sound as simple as:

S 'The situation we are faced with is...'
   'The context in which we are operating is...'

by John Lunn, Emergency Management Courses Coordinator, School of Public Health, Charles Sturt University, Bathurst, New South Wales

'What has happened is...'

M 'Our mission is to...'
   'What we are trying to achieve is...'
   'Our overall objective is to...'

E 'To accomplish our mission we need to...'
   'To attain our overall objective the things we need to do are...'
   'We need to do the following things...'

A 'The responsibilities for each objective are delegated to the following people...'
   'The 'who' is going to do 'what' is as follows...'

C 'We will maintain communications by...'
   'You will talk to me by...and I will talk with you by...we will all talk again...'

It has been suggested by Mr Ian Matterson, Magistrate and Coroner in Hobart, that it may not always be the case that operational briefings have been provided. I agree, and this may be because:

• until someone reaches the scene and reports back you don't know what you have and what response might be required
• it seems to be 'so insignificant' that a briefing would seem 'over the top' and a source of ridicule but with the benefit of hindsight it would in a number of situations have been a rational response
• a lack of understanding and training in the process.

It is however an appropriate process that enables events to be managed more efficiently and effectively either as a response to a known major event or upon subsequent intelligence reports of an event's magnitude. It can also accommodate the changing natures of an event as more and more information becomes available.

Operational debriefing

My initial thought was perhaps we could use the SMEAC process for the debriefing as well as the briefing and there appeared an attractive logic in just asking 'did we do what we planned to do in each element of our briefing?' I soon concluded that was not sufficient as often the major benefits arise from identifying those things that were unexpected, not planned for and how they were managed. I therefore decided it was best to stand back and consider first ambient issues, the context, philosophy and then a strategy.

Ambient issues

There is the issue regarding litigation concerns, and in our increasingly litigious society I suspect that there is much covering of one's backside by individuals and organisations. I further suspect that this would affect evidence that people and organisations are willing to put before an operational debriefing and perhaps a coronial inquiry. Even if indemnity from criminal prosecution could be offered to individuals in exchange for evidence of malpractice, it does not overcome the prospect of civil suits and the fact that they still want their job, and 'whistle blowers' have almost always ended up as victims.

It is also important to keep in mind that critical incident debriefing and operational debriefing are different processes and have different contexts and I would say it is a bit like comparing a screwdriver with an orange. Each, when used for the purpose it was intended, may be useful, but to compare the two is a fruitless exercise. It is an observation of Mr Ian Matterson that 'at an organisational level a debrief can degenerate very quickly into either a backslapping or a back-covering exercise (depending on the success or otherwise of the operation) or may even be used to apportion blame on an individual/s'.

At a multi-agency level where, for example, police, fire services and emergency services have all been involved, similar considerations could arise.

It has been noted that single service debriefings can be more 'open' and self-critical and there is a great reluctance to 'wash ones dirty linen' in a more public forum such as a multi-agency debrief. I have heard the instruction given prior to a multi-agency debriefing that has gone along the lines of 'don't throw mud at them

then we will not get it back a another time'.

The third grouping for debriefing, i.e. at the personal level takes on a different hue and, indeed, a totally different approach is adopted. This is because not only is there a debriefing per se, but the aspect of personal counselling on issues arising from the debriefing can be immediately undertaken.

But the matter I consider to be of greatest importance is what happens with the information and ideas that arise from the debrief?

For the sake of an example, I turn again to Port Arthur. It became apparent during our debriefing at the multi-agency level that, apart from some police officers, there was little understanding of the true role of the coroner at the organisational level of a major disaster. Accordingly, in conjunction with police, hospital and emergency services personnel we drafted a Coronial Disaster Plan which set out the role of coroners, coroner's associates and police at such an incident.

This plan was then incorporated into the Sate Emergency Disaster Plan to ensure a reference point should any unfortunate disaster again inflict our State, and to ensure that the leader of one organisation would not attempt to take control of a situation that is really the province of the coroner.

This move by the Coroners prompted the medicos at the Royal Hobart Hospital to complete their own disaster plan. Having these plans on paper is of course somewhat meaningless unless the contents are known and understood—to that extent field exercises and desk-top exercises involving these plans are necessary to ensure they don't just gather dust. At least this demonstrates that some tangible good can flow from the debriefing after a disaster.

Mr Ian Matterson added that: 'One of the difficulties in a disaster situation is the constant facing of the unexpected where there is no time for a proper briefing—where a person is faced with a problem that requires an immediate action or solution'. Praise or criticism will no doubt flow at the debrief as to the action taken, at a time when 20/20 hindsight will be available by the truckload!

So long as the action taken has been fully documented as to the time factor and opportunity, then the debriefing process can contemplate a proper analysis from which others may learn.

Mr Ian Matterson then said that: 'My current thoughts are that it is not an easy task to consider all the relevant factors of the debriefing process by way of lists or rules because (a) there are different types of debriefing and (b) there may be different targets/results being sought by those performing the debrief. If this is so then we may not be comparing apples with apples'.

Operational debriefing process

Context
Understanding and recording the context is very important to management of the dynamics, the subsequent understanding and interpretation of debriefing reports.

The context should include information on:
- what happened, where, and the date and time in general terms and the time between the event concluding and the debriefing
- where the debriefing took place and which organisations and people were present
- what legislation, regulations, policies and procedures are germane to the event
- anything else that would assist in understanding the context of the event that is the subject of the debriefing.

Philosophy
An operational debrief can serve a number of different purposes and these can be either be complimentary or in conflict.

These purposes can include:
- producing a record of actions taken by whom
- blame allocation
- credit recognition
- defusing
- a learning experience.

It is therefore important that whoever is leading the debrief has a clear objective and that this is communicated to all the parties involved.

Strategy
This paper proposes the use of a consistent and logical strategy and process, which may help, address many of the issues that debriefings raise.

One such strategy is:
Step One: objective of the debrief defined
Example: The purpose of this debrief is to produce a record of 'who' did 'what' 'when' 'how' and 'why' and to use this record to identify what was done 'well' and what things could be done differently the next time a similar event had to be managed.
Step Two: the event described
Example:
- When was it first noticed that there was

a concern?…time and date
- Who first noticed that there was a concern?… name, occupation, organisation, contact details
- Who alerted other people to the concern?…name, occupation, organisation, contact details
- Who did they alert to the concern?… name, occupation, organisation, contact details
- How did they communicate the alert?
- Which organisations attended/were involved?
- When did each organisation arrive?
- Who was in command of each organisation?…name, occupation, contact details
- Which organisation was designated the lead combat authority and by whom?
- Which organisation was 'controlling' (managing) the response?
- Who was the designated event controller and by whom?
- What were the emergency management plans/procedures relevant to the management of this event?
- What were the legislation and or regulations relevant to the management of this event?
- How were communications established and maintained between each responding organisation?
- Where was each organisation's command post established and why?
- Where was the control post/centre established?
- When/where did the media attend?
- What was the media management plan/strategy relevant to this event?
- Who briefed the media?…name, occupation, contact details.
- How many people attended the event from each organisation?
- What were the numbers of deaths and injuries?
- Where were the casualties transported?
- If triage was implemented, where was it located?
- What actions were taken by each responding organisation?
- What was the size of the area affected directly by the event?
- What properties were affected and to what extent?…owner/operator of each property and contact details
- What materials, equipment and other resources were used in responding to this event?…numbers, sizes, owners
- What was the cost of the response to this event?
- Who calculated the costs?…name occupation contact details
- What were losses in $?…insured and uninsured?

- Who is the insurer?…name and contact details
- Who is accountable for the management of the recovery and restoration aspects of this event?…names and contact details
- Which organisations have which roles to play in the recovery and restoration process?…names and contact details

Step three: event management analysed
Example:
- As far as the commander of each responding organisation concludes, what were the key actions that they took that contributed to the management of the event?
- As far as the commander of each responding organisation concludes, what were the key actions taken by other organisations that contributed to the management of the event?
- As far as the commander of each responding organisation concludes what would they do differently next time they have to respond to a similar event?
- As far as the event controller concludes what would they do differently next time they have to respond to a similar event?
- What could be done to prevent a similar event in the future?
- What could be done to reduce the incidence of damage and harm if a similar event were to occur again?

Step four: Report produced
The information from steps one, two and three provide a rich source of information from which to describe the event and produce appropriate conclusions and recommendations.

It is important that the documentation process commence as soon as possible, during or after the impact. It is difficult trying to gather all the information some time after the event when memories and pieces of paper can go astray.

There is a myriad of formats that could be used for the debriefing report and the one I am suggesting is as follows:

Section one: Context of the event described including, history, relevant legislation, regulations, policies, weather conditions, season and anything else that would enable the reader to understand the 'context' in which the event took place.

Section two: Event description including location, dates, times, areal extent, severity, consequences, all the information from step two of the debriefing process and anything else that would enable the reader to understand the hazard and the effects.

Section three: Event management analysis including all the information

from step three of the debriefing process and anything else that would enable the reader to understand the event management.

Conclusion
Firstly, there are some important distinctions between operational briefings, operational debriefings and critical incident debriefings—each have their discrete purpose and the processes used are not interchangeable. Secondly, there is no universal operational debriefing process being used. Thirdly, operational debriefings currently focus on 'what' happened when perhaps that should be just an interim step to identifying the lessons learned and implemented.

In a recent Public Entity Risk Institute Internet Symposium, Wednesday October 18 2000 a paper posted by Mark Smitherman, Deputy Chief officer Nottinghamshire Fire and Rescue Service included the following observations:

'The traditional problem diagnoses and associated Post Incident Review used within the UK are frequently symptomatic, and corrective actions are often ineffective. There is a tendency to concentrate effort on equipment and human error issues, but very little on organisational, programatic, and cultural issues, ie. an over-concentration on causes that are proximal to the problem. Often the fire service needs to dig deeper than the "sharp end" issues it is so comfortable dealing with!'

This is typical of much contemporary thinking on the issue where a concern and a deficiency has been identified and agreement is forthcoming on 'what' needs to be included but little is offered on 'how' to do it.

The debriefing process that I have provided does offer a way to accomplish a useful operational debrief; and if a rationale approach was adopted universally it could accomplish:
- the minimisation of negative ambient issues
- appropriate credit/blame allocation
- a consistent recording format that is more easily understood
- an Australian standard and its associated benefits.

A couple of times, when reviewing this paper to summarise and draw conclusions, I formed a view that because of the legal and political elements it has been, and would always prove to be, impossible to conduct worthwhile operational debriefings. With that thought in mind I considered that perhaps it might

be best to just recognise that fact and save the time and energy wasted on that which is not achievable. But ultimately, I concluded that if we do not try and learn from our mistakes and reinforce the lessons from our successes, we are destined to repeat our mistakes, reinvent wheels and retard our progress in managing events.

However, do not think that this paper is the definitive work on how operational debriefs should be conducted. But rather, I hope that it will be a catalyst for much more dialogue and debate which will ultimately produce something by someone that will be of use internationally to satisfy an identified need.

Reference
Mark Smitherman's paper: 'British Styles of Incident Safety; Command Decision Making and Team Knowledge' located at http//:pinta.mxdii.com/cfboard/thread.cfm

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Natural Hazards and the risks they pose to South-East Queensland

Edited by Ken Granger and Matthew Hayne

Reviewed by Alan Hodges

Natural Hazards and the risks they pose to South-East Queensland is presented in an attractive 24-page summary booklet together with a CD-ROM of 389 pages. This study of natural hazard risks has been undertaken by AGSO-Geoscience Australia. It was conducted in conjunction with the Bureau of Meteorology, and in cooperation with Queensland's Department of Natural Resources and Mines and Department of Emergency Services, and with eight local government councils. The report is the fourth in a series of case studies conducted under AGSO's *Natural Geohazards Vulnerability of Urban Communities Project*, more usually referred to as the *Cities Project*. The techniques used and knowledge gained during the earlier studies have clearly been of much benefit in this fourth case study.

The geographic area studied is home to 2 million people and is one of our fastest-growing urban areas, stretching south from Brisbane to the Gold Coast, north to Bribie Island and inland to Ipswich (150 km north to south and 110 km east to west). It is an area subject to significant hazards. Separate chapters in the report consider in detail eight hazards: tropical cyclones, east coast lows, severe thunderstorms, landslides, earthquakes, floods, heat waves and bushfires. In addition, hazards and risk concepts, the south-east Queensland setting, and the elements at risk and their vulnerability are covered in three introductory chapters, and the report concludes with a multi-hazard risk assessment. The report was written by a total of 13 experts, with the major contribution by Ken Granger who is a joint author of 10 chapters. Support for the study has also come from academia, in particular from David King and Linda Berry of the Centre of Disaster Studies, James Cook University, Russell Blong of Risk Frontiers-Natural Hazards Research Centre, Macquarie University and 'Dingle' Smith of the Centre for Resource and Environmental Studies, ANU.

This is indeed a landmark study. It is the first time that such a comprehensive approach has been taken to risk assessment for such a large Australian urbanised area. The building planks for this study are the approach of the Australian-New Zealand Standard on Risk Management, and the systematic and thorough consideration of five 'esses' for each hazard: Setting, Shelter, Sustenance, Security and Society. Considerable use is made of integrating information using GIS capabilities. Analysis is conducted at the level of a Census Collection District (CCD), of which there are over 3 000 in the area, each typically comprising 200 households. The relative importance of each CCD is derived by consideration of the five 'esses'. Then, from development of relative risk

indices, identification is possible of areas that contribute disproportionately to community risk.

Residents born in the last quarter of the 20th Century and many who have migrated from southern States to South-East Queensland have not experienced a major disaster in the area. The last significant catastrophe was the Brisbane-Ipswich flood of 1974, which is still the most severe urban flood experienced in Australia. Chapter 9 on Flood Risks gives realism to the effects of this hazard by quoting graphic newspaper accounts of the 1974 floods, as well as the 1893 floods which had an approximately 50 per cent greater depth. In considering each of the eight hazards, the report demonstrates evidence of significant research of their history in Queensland and their effects on the area of the study. This background information vividly brings home the real threat that exists from a number of natural events.

A major benefit of the study is its contribution to our understanding of the issue of vulnerability to risk through the detailed analysis of elements of communities, i.e. the people and their physical and social infrastructures. For instance, in the examination of societal issues, consideration is given to such matters as language, ethnicity and education. Similarly, security issues involve examination of availability of medical facilities, industries, emergency services, flood detention basins and emergency plans. This report is thorough and detailed. For instance, information is provided of Woolworths' food resupply arrangements and the location of depots holding dry goods, cold stores and fruit and vegetables. The report concludes that there would be a significant, if hidden, threat if the current efficient food-

resupply system were disrupted by a major disaster.

As a result of the analysis, maps have been produced for each of the five 'esses'. These show suburbs with vulnerability indices, colour-coded into six levels, thereby providing essential information for evaluating risk.

For each of the hazards, the reader is provided in the first instance with a comprehensive understanding of the physical phenomena. This is a foundation for the analysis of historical occurrences and interpretation of risks. In the final chapter dealing with A Multi-Hazard Risk Assessment, the common measure adopted to compare risks is the level of building damage (accepting that this excludes intangible costs of fatalities and injuries). This last chapter concludes with some very sensible suggestions in relation to risk information and risk communication, the use of modelling and exercises, the need to consider the effects of climate change, and the protection of lifelines. This final chapter, together with the first three chapters and the excellent Executive Summary, will be of interest to all readers. Chapters on specific hazards may have more specialised appeal.

This is a report that cannot easily be read in one sitting because of the amount of detail it contains. It is well written, contains appropriate maps, tables and photographs, and is consistent in approach throughout—a credit to the two editors. An extensive bibliography is provided, and this is a further example of the thoroughness of the study. Although the CD-ROM provides benefits for convenient searching and for map viewing, it is a difficult format to use for reading such a large report. I believe that production of this important study in book form is warranted.

This report will be of particular use to the eight councils in the South-East Queensland area and various Queensland State Government agencies. For others with an interest in or responsibility for emergency management and community safety, this is an invaluable resource. It illustrates how information from disparate sources can be integrated to provide a greater understanding of hazards, of elements at risk and of vulnerability, and of their combined effect on risk.

Natural Hazards and the risks they pose to South-East Queensland is available from the AGSO-Geoscience Australia Sales Centre for $45.10 plus postage. Email: sales@agso.gov.au

Working with the community in emergency risk management

Introduction

In recent years the emergency management (EM) sector in Australia has been gradually adopting the risk management framework as a way of more comprehensively dealing with risks likely to lead to emergencies and disasters. Emergency risk management (ERM) is becoming a key tool for organising the full range of activities emergency managers undertake.

ERM has been the result of a translation of the risk management process, as outlined in the risk management standard (Standards Australia 1995), into a form that is appropriate for the emergency management context. The main issue in this translation has been the adoption of a process that was designed for managing risks to *organisations* in a context where the focus is on risks to *communities*. There are quite fundamental differences between fairly 'bounded' entities like organisations that have clear goals compared with multi-layered and unbounded entities like communities. Without going into detail about the differences here, an important facet of working in the community context is the greater number and range of 'stakeholders' involved in the process. Communication and consultation is a central part of any risk management process, and this is even more the case with ERM. As a consequence, the ERM process as espoused by emergency management practitioners, places great stress on working with the community through 'communication and consultation' (EMA 2000; Qld Dept of Emergency Services 1999).

As part of its role in assisting the EM sector implement ERM, Emergency Management Australia has been involved in a number of 'case studies' around the country. These case studies provide a way of gaining insights into how the process is actually working and valuable learnings for those who will undertake it. Most of the case-study projects are still in their early stages, as are many of the ERM projects being undertaken throughout Australia. One key theme that is already emerging from the case studies however is the complexity and difficulty of doing community consultation.

In this article, I want to briefly focus on

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one aspect of community consultation — the issue that ERM practitioners face in deciding what is the right 'level' or 'degree' of working with and involving the community. I do not want to give any didactic directives about how they might do this. There is a mountain of texts and resources on the topic (which *are* by the way very important and need to be drawn upon). What I want to do instead is briefly reflect on this issue using the case studies and our experience at EMA as a springboard. In this way I hope to stimulate further debate about the meaning of working with the community in the ERM context.

Community

One issue in deciding how to work with the community is the problem inherent in trying to define *who* the community is. This is not a new problem, and certainly not confined to EM. In a recent issue of the Australian Journal of Emergency Management, Marsh and Buckle (2001) argue that emergency managers tend to use an oversimplified and essentially false notion of 'community'. This notion has the effect of obscuring the mixed composition and complex layerings of actual community life, which thus ultimately leads to a failure in targeting services to community needs and concerns. The authors argue that we need to start employing a more sophisticated understanding of community.

In a related way, the complexity of communities has ramifications for how we involve people in the ERM process. If the standard notion of community misses the mark, then likewise for our common notions of community consultation. If we are not taking *who* we need to involve seriously enough, then we may not be able to know *how* to involve them adequately or *why* it will be of benefit. Therefore, as a follow on to the issues raised by Marsh and Buckle (2001), we also need to

broaden our understanding of community involvement.

The objectives of practitioners

A good place to start in prising open this issue is to look at different reasons for working with the community. The case studies are providing some interesting insights into the range of reasons practitioners are citing for engaging the community. These reasons include:

- we want political support for the project — we want to legitimise the process
- we want to provide information and knowledge to the community — to inform, to 'educate' them
- we want the community to support our project
- we want to know what the community members' views are — eg. what they think, their perceptions of risk, their expectations of us
- we need people to provide us with their local knowledge about the area — we need people to tell us things we don't know
- we want people's 'buy in', and for them to have some 'ownership' of the project
- we want people to participate in the project — we want people to work on things with us, to do things for us
- we want people to change their behaviour in relation to risks

As this list shows, there is a range of reasons for consulting. It could be argued that all of these reasons are part of genuinely and successfully working with the community. But at the same time, a focus on one reason can lead to ignoring the others.

The different reasons ERM practitioners cite for involving the community raises the question of what is an appropriate 'level' or 'form' of working with the community? There is no definitive answer to this question. I would like to touch on three reasons why this is the case. The first one relates to the variability in ways of undertaking ERM, the second to the nature of the ERM process itself, and the third to the ways we define consultation.

The variability of projects

To some extent there is no definitive

answer to this question because ERM can be conducted in an infinite range of ways. How ERM is undertaken will shape the kinds of community engagement necessary for it to work. The case-study projects for example exhibit a diversity in ways of conducting the process, and it is not easy to type-cast any of them. One of the projects for example is being conducted at State level. The 'community' of interest in this case is the entire population of the State. This has definite implications for consultation and how much one can actually involve the public in the process. It is obviously completely impractical to discuss the issues with all the members of the State. Some other level of 'representation' or 'sampling' is needed. At the other end of the spectrum, another of the case studies is being conducted in a small semi-rural local government area. This project has been able to directly involve a range of community members in its implementation and draw on the views of the majority of households within the Shire. The scale of the project therefore is one factor in shaping its implementation and the possibilities for working with the community.

The nature of the ERM process

This variation and flexibility in undertaking ERM brings us to the second point—the nature of the process itself. ERM can be done in so many ways because it is an *abstract* process. By this I mean that it is an intellectual framework for solving problems (ie. managing risks) at a very general level. It is not related to any particular problem or risk, but a series of steps to deal with any problems. To this extent it is a 'big picture' management process, technically able to draw into its ambit anything that practitioners are prepared to grapple with. In addition, ERM is a process designed to deal with multiple problems (multi-hazard, multi-risk, diverse communities) at the same time.

Where the complexity comes in is that implementing ERM involves handling the overall management of a range of problems at a general level, as well as managing particular problems in very specific ways. This introduces the issue of a mix of different goals and objectives within the process. On the one hand the goal of 'managing risk' at a general level is fairly intangible. It is a goal that you are never sure you have reached. In fact, there is no stated 'endpoint' in the process. The guidelines stipulate that the process needs to be worked through and revisited constantly.

On the other hand, ERM also involves doing something about or *treating* particular risks. This entails identifying, choosing and implementing solutions to particular problems. In this case, its goals are quite tangible and familiar to practitioners. Our experience of teaching ERM at the Australian Emergency Management Institute bears this point out with practitioners very often impatient with early stages of the process, the 'big picture stuff', and eager to 'get to the real nuts and bolts stuff' of treating risks.

This mix of tangible and intangible goals has implications for how to work with the community. For example, in the 'establish the context', and 'identify risk' stages, there is a need to discover the community's perceptions about what risks exist and how important these are regarded as issues in their lives. This stage is about establishing what the problems really are and making sure that the project is relevant to the community. Working with the community here could be focused on asking people what they think.

Later in the process when it comes to doing something about particular risks—implementing solutions—practitioners often want community members to do things themselves, to take on responsibility for risk reduction, for changing risky behaviour. Here the focus is squarely on community members taking control of the issues for themselves.

In short then, practitioners have different immediate objectives in relation to working with the community at different stages of the process. This is one reason for the broad range of practitioners' responses given in the case studies.

Definitions of consultation

A third aspect of the difficulty in determining the level of engagement with community relates to our concepts. We have a problem of definition. For instance, when we use the term 'consultation', what do we mean? A glance at the Australian Oxford dictionary (Hughes, et al. 1992) shows that 'to consult' means variously:
• to seek information or advice from a person
• to refer to a person for advice, an opinion
• to seek permission or approval from a person for a proposed action
• to take into account, to consider feelings and interests.

The term itself therefore contains a range of possibilities. It is a bit like 'how long is a piece of string?' *Where* a practitioner, committee or organisation chooses to cut the string depends on values,

commitments, perceptions, practicalities, politics et cetera.

So far, I have been using the terms 'consultation', 'involvement', 'participation' and 'engagement' interchangeably. This slippage between terms reflects the overlap between the meanings and the fact that there is a broad range of possible levels of working with the community contained within them. Referring again to the reasons given by practitioners for consulting, it is apparent these different degrees of working with the community are implied in their responses. Some reasons are simply about asking people what they think, others are about wanting to give people some control over an issue.

The question again then is how does one decide on the degree of engagement? Here the risk management standard itself or the ERM guidelines do not offer us many insights.

A useful typology to introduce is one developed in another area of public policy—that of community health. Smithies and Webster (1998) outline a 'ladder of participation' (*Table 1*). This ladder has its origins in American social planning circles (Arnstein 1969). Depicted are the degrees of participation that a health organisation may elicit from community members (participants) in regard to a program or decision-making process.

This table is very useful because it defines, in this case 'participation', as a continuum of activities. 'Consultation' has a fairly circumscribed place on the ladder in this reading, but the we could equally see all of these as degrees of consultation, or degrees of working with the community. The theme running through this continuum, however, is about how much *control* community members have in the decision making process.

Whatever words we use to describe working with the community, the issue therefore is about the power to make decisions. An important point to emphasise is that power will always be shared. A practitioner or committee facilitating ERM will always have some power over the process. The issue is the extent to which this power might be shared with members of the community at any particular stage of the process.

Interestingly, there is a degree of similarity between the different levels of participation depicted in the table above and the reasons for consultation provided by practitioners in the ERM case studies. We can construct a table, similar to that of Smithies and Webster, linking practitioner's reasons for consulting with different degrees of power sharing (*Table 2*).

Degree of	Participants' action	Illustrative mode	
Low	None	The community is told nothing	
	Receives information	The organisation makes a plan and announces it. The community is convened for informational purposes; compliance is expected.	
	Is consulted	The organisation tries to promote a plan and seeks to develop the support which will facilitate acceptance or give sufficient sanction to the plan so that administrative compliance can be expected.	
	Advises	The organisation presents a plan and invites questions. It is prepared to modify the plan only if absolutely necessary.	
	Plans jointly	The organisation presents a tentative plan subject to change and invites recommendations from those affected. It expects to change the plan at least slightly and perhaps even more subsequently.	
	Has delegated authority	The organisation identifies and presents a problem to the community, defines the limits, and asks the community to make a series of decisions which can be embodied in a plan which it will accept.	
High	Has control	The organisation asks the community to identify the problem and to make all of the key decisions regarding goals and means. It is willing to help the community at each step to accomplish its own goals, even to the extent of administrative control of the program.	

Table 1: Ladder of participation (Smithies & Webster 1998).

Degree of power sharing.	Reason for consulting		
Low	We do not want the community to know		
	We want to give the community information		
	We want the community to support us in this project		
	We want some limited input from the community; we want to 'hear' their views		
	We want the community's input to help us make decisions; we want to use some of their local knowledge		
	We want the community to make some decisions in parts of the process		
High	We want the community to take major responsibility for key parts of the process; we want them to significantly take control of risk reduction activities		

Table 2: Practitioner's reasons for consulting with different degrees of power sharing.

Although this is a rough sketch, *Table 2* provides a tool for practitioners to think about their reasons for working with the community in terms of the amount of control or power they are prepared to share with others. It brings to light a dimension of the issue of decision making which was hidden in their original list of reasons.

Returning to a remark made earlier, these points are not intended to provide directives on how to work with the community. Rather, that different ways of working and involving others are not only about the articulated reasons for doing so — ie. what you are trying to achieve in the process — they are also about a dimension of power that is often overlooked.

Final note
I have briefly touched on some issues related to one aspect of working with the community — determining the level or degree of involvement to pursue. There are of course many other aspects of working with the community that need to be debated.

What the points raised here attempt to do is stimulate further discussion about the issue in the emergency risk management context. The ERM case studies are providing useful material for this purpose. Ultimately, I want to stress the importance of being clear about what we are doing when we say we are 'consulting the community'.

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Hazard and risk management: guidelines for local authorities

Introduction

Natural and man-made hazards, such as land instability, flooding, earthquakes, power failure, and dam failure, have the potential to cause significant environmental, social and economic loss through damage to people, communities, ecological and heritage areas, as well as to crops, livestock and infrastructure.

Land uses that fail to recognise areas prone to hazard risk such as floodplains, coastal erosion, and earthquake faults are not sustainable, and can cause communities and the environment unnecessary harm. Communities need to be developed in a sustainable manner by ensuring a close linkage between hazard mitigation and land use planning (Daly 2000).

Local authorities in New Zealand, which include city, district and regional councils, have statutory obligations under the Resource Management Act 1991, the Building Act 1991, the Local Government Official Information and Meetings Act 1987 and the Civil Defence Act 1983 in relation to the management of hazards affecting people, communities and other aspects of the environment. The future Emergency Management legislation (currently the Civil Defence Emergency Management Bill) will require a more comprehensive risk management approach to civil defence and emergency management. In particular, the legislation provides for planning and preparation for emergencies and for response and recovery in the event of an emergency enabling communities to achieve acceptable levels of risk.

Although required to by statute, research has indicated that local authorities in the Auckland Region (four city councils, three district councils, and one regional council) seem to be having difficulty in effectively managing hazards information. (Auckland Local Authority Hazards Liaison Group 1999). This is due to a number of problems, including a perceived lack of expertise in the risk area, uncertainty in the interpretation of hazards information, and difficulty in applying the generic Australian/New Zealand Risk Management Standard (AS/NZS 4360:1999) to specific risk management issues such as this. This has lead to

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inconsistencies in the way hazard information is managed and a lack of direction on the options available to treat risk.

In addition, the Auckland Region's population is rapidly growing. The resulting urban expansion is placing pressure on local authority decision makers to allow the development of areas previously considered unsuitable for development due to their proximity to industrial or contaminated sites, land instability, flood risk and the like. This emphasises the urgency for local authorities to capture hazard information and incorporate it into planning and decision making processes.

The hazard guidelines project aims to produce a set of guidelines focused on addressing these current management problems, assisting local authorities to meet their statutory requirements while presenting a user-friendly approach to means of assessing and treating risk.

Auckland Local Authority Hazard Liaison Group

The Auckland Local Authority Hazard Liaison Group (the 'Group') was established by the Auckland Regional Council four years ago to enhance communication between local authorities on hazard management issues and to facilitate intra-council communication. The Group is made up of representatives from the city, district and regional councils in the Auckland Region comprising mainly planners/policy analysts. The members of this group act as coordinators for their own intra-council hazards group. The Group was set up to specifically recognise the link between hazard mitigation and land use planning, and the need to develop tools in these areas to successfully manage risk, and to improve communication between those working in the area of sustainable development and environmental management.

The Group discovered that there was a range of management issues concerning the collection, storage, interpretation of hazard information and the way it was used to influence decisions about managing risks. Examples of issues raised include the recording of hazards information known to council staff but not presently included in hazards registers, inconsistency of hazards information, lack of knowledge of information systems, and inappropriate systems. The Group felt there was merit in working together to collectively improve the situation and resolved to develop a set of guidelines to address the various issues that have been raised.

The Group's interest in putting together these guidelines arose from the Group's commitment to:

- achieve consistency both within and between councils in the Auckland Region in the way hazards information is collected, organised and used to influence decisions about managing risk
- ensure risk management issues are appropriately addressed in land use and strategic planning
- maximise the effective use of hazards information to manage risks from hazards, and promote greater public understanding of the local hazardscape
- encourage local authorities to reduce barriers to sound risk management and in particular encourage effective risk communication practices
- minimise local authority liability through the effective capture and storage of hazards information.

The overarching goal of the Group in developing the guidelines is to:

Minimise the risks to communities and the environment from the effects of a range of hazards, including (but not limited to) natural and technological hazards.

Scope of hazard guidelines 1, 2, and 3

The first guideline *Hazard Identification and Information Management for Local Authorities*, completed in June 1999, establishes the context and identifies sources of hazard information. It also looks at how this information is collected,

sorted, recorded and stored. It is especially relevant to the development and maintenance of hazard registers.

The second and third guidelines, in the process of being developed, examine how this hazard information can be assessed, in particular, hazard and risk analysis and evaluation, and the choices of appropriate actions to mitigate the consequences of risk, e.g. local authority planning and decision making processes. A monitoring component will also make up part of the third guideline to determine the effectiveness of all three guidelines in achieving their desired outcomes.

All three guidelines are inter-related and are intended to provide a comprehensive set of principles for managing risk. They are intended to facilitate communication about hazards within and between a number of agencies. Those agencies include those with responsibility for hazard and emergency management and control of development, such as local authorities and emergency services, and also those which provide information and advice to decision making authorities, such as Crown Research Institutes (e.g. Institute of Geological and Nuclear Sciences (IGNS), National Institute of Water and Atmospheric Research Ltd (NIWA)), universities, and consultancies. The guidelines are also intended to facilitate communication between these agencies and the public they serve.

The aim of the guidelines is to achieve consistency both within and between local authorities in the way hazard information is managed, particularly with regard to the application of the Australian/New Zealand Risk Management Standard (4360:1999). However, the aim is to achieve consistency—not standardisation—of practice. There will continue to be differences in the ways in which local authorities store and process information, and in the practices they adopt to fulfil the functions for which they have statutory responsibility, but applying this Guideline to those practices should ensure that the outcomes achieved are consistent within and between local authorities.

Hazard Guideline 1: Hazard identification and information management

Prudent execution of the hazard management functions placed on local authorities by various statutes (noted earlier) requires the establishment and maintenance of an information base which records information about hazards known to those authorities. Some pro-

visions of the statutes rely on that information to trigger the need for further investigation if or when development is proposed. Other functions within local authorities use the information as a basis for carrying out risk assessments, either as part of the development control process, or to identify and avoid or mitigate unwanted consequences of hazards.

In either case, the recording of information about known hazards is important for the protection of people, property and the environment from unwanted consequences of hazard events. The Australian/New Zealand Risk Management Standard (4360:1999) sets out a series of steps designed to reduce unwanted

> The aim of the guidelines is to achieve consistency both within and between local authorities in the way hazard information is managed...

consequences of activities i.e. reduce risk.

Hazard Guideline 1 develops outcomes and corresponding principles designed to bring about consistency in the identifying, recording and storing of information about hazards. Figure 1 provides an excerpt from Hazard Guideline 1. It provides guidance on developing processes to identify, record, and store information relevant to the hazard concerned. The Guideline has been kept general to allow the principles introduced to be applied to a broad range of hazards (natural, technological and biological hazards) in a variety of locations. This should ensure that local authorities discharge the responsibilities placed on them by various statutes in relation to natural and other hazards, in a consistent and effective manner.

The following outcomes have been identified in Hazard Guideline 1.

Identification of hazards and sources of hazard information

1. The range of hazards about which information is to be recorded is decided with regard to the roles and

responsibilities of the local authority, and the characteristics of the district.
2. Sources of hazard information are identified including: actual (existing), potential, externally generated and internally generated.
3. A formal documented process for collecting/receiving hazard information is implemented.
4. Information providers are aware of local authority's requirements for hazard information and its procedure for managing the information.
5. Local authority staff are trained in and aware of the duty to identify hazards and sources of hazard information.

Categorising hazards information

1. Hazards information is consistently assessed in terms of integrity/validity of source, quality of information and the level of verification.

Storage and maintenance of hazards information

1. A formal documented process for storage and maintenance of hazards information is implemented.
2. The source of the hazards information is apparent.
3. The hazards information is accessible/available to end users and is tailored to the needs of end users as much as is possible (with given technology).
4. The integrity and consistency of hazards information is maintained through rigorous and ongoing checks so there are no gaps in time or information.
5. Corporate knowledge is retained.

This guideline can also be used to evaluate existing processes and systems. It can be most effectively used to assess current practice of hazard information identification, collection and storage, to evaluate current practice in light of the outcomes and principles, and to develop better practice.

Implementation of Hazard Guideline 1

A working draft of Hazard Guideline 1 was completed in June 1999. The six months to the end of December 1999 focused on its implementation in each of the local authorities in the Auckland Region. In January 2000, a review was conducted of the process used to develop Hazard Guideline 1 and on how well implementation was progressing. The aim of this review was to improve the development process for subsequent guidelines.

The development of Hazard Guideline 1 has served to highlight the importance of adequate hazard information processes

Sources of hazard information are identified including:
- actual (existing) sources
- potential sources
- externally generated sources
- internally generated sources

General Principles

▶ Risks arising from hazards change depending on the nature of both the physical events and the characteristics of the community under threat.

▶ Establish a contact list of hazard information producers or sources.

For example, information may be collected from:
- hazards analysts or consultants undertaking district-wide hazards analyses (eg. a 'scan' of a district, to identify hazards, the risks from which may require formal assessment as a basis for preparing an Emergency Management Strategy) or investigations of specific hazards in parts of a district (eg. investigations of areas of forest or regrowth, which may pose 'wildfire' risks; or of coastal areas which may be erosion prone).

- council's engineering staff, engineers of infrastructure providers, or consulting engineers, carrying out engineering investigations for infrastructure works (such as road realignments or reconstruction, new road construction, and pipeline or transmission line construction, and the like).

▶ Record the source with the hazard information so future users can refer to the original source if necessary.

▶ Set up a process to maintain this database of sources (change of contact details etc.).
This should be as simple as possible to encourage its use.

Figure 1: Identification of hazards and sources of hazards information, Hazard Guideline 1.

within local authorities and has assisted some local authorities to acquire additional resources. Implementation overall however has been patchy for various reasons including council restructuring, variable resourcing and lack of internal awareness (Daly 2000). As part of the development of Guidelines 2 and 3, the Auckland Local Authority Hazards Liaison Group and local authority management are making renewed effort to ensure implementation occurs.

Hazard Guideline 2: Hazard risk assessment, and
Hazard Guideline 3: Hazard risk treatment and monitoring

The Auckland Local Authority Hazards Liaison Group reconvened in May 2000 to continue the development of the guidelines. Following recommendations arising from the initial review of Hazard Guideline 1, the Group then sought support and buy-in from local authorities in the Auckland Region and also further afield from various local authorities across the country for the development of guidelines 2 and 3. The support and commitment has been very encouraging.

A comprehensive review of Hazard Guideline 1 is currently being commissioned with the aim of improving the suitability of the content of Hazard Guideline 1 and the process used for its

development and implementation. Given that implementation began in June 1999, it is considered that any issues arising from the implementation phase will now be apparent.

The content and the process for developing Hazard Guideline 2 and Hazard Guideline 3 is currently being scoped in detail and will incorporate the findings from the review of Hazard Guideline 1 where appropriate. It is anticipated that a draft of Hazard Guideline 2 will be completed by November 2001, and a draft of Hazard Guideline 3 by February 2003.

References

Auckland Local Authority Hazards Liaison Group 1999, *Hazard Guideline 1: Hazard Identification and Information Management for Local Authorities*, Auckland Regional Council Technical Publication No. 106, June 1999.

Daly M.C. 2000, *The Development of Hazard Information and Risk Management Guidelines for Local Authorities*, unpublished research paper, Auckland University.

About the authors

Sharlene Pardy is a Strategic Policy Analyst with the Auckland Regional Council and has four years experience developing and analysing policy in the areas of land, air and water quality management, risk management, infrastructure including stormwater and roading policy, and the coastal environment. She has a BMS(Hons) in environmental management and economics from the University of Waikato. Sharlene is project coordinating the hazard guidelines project.

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Michele Daly is the Manager of the Hazards Management department of the Auckland Regional Council. She has a MSc (Hons) in geology from Auckland University and a Diploma in Environmental Management, as well as papers in law, environmental economics and planning. Michele brings over 15 years combined experience working mainly in the areas of hazard and risk assessment, hazard monitoring, geohydrology, water resource management, and emergency management. Michele was involved in the preparation of Hazard Guideline 1, and was instrumental in establishing the Auckland Local Authority Hazards Liaison Group.

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March 15-17, 2002
Napier, New Zealand

New Zealand Society for Earthquake Enginee-ring (NZSEE) 2002, Technical Conference and Annual Meeting
Conference theme is 'Learning from Earthquakes: What Are the Gaps in Our Mitigation and Preparedness?'
Contact: Conference Coordinator, NZSEE
P.O. Box 13 482, Wellington, NZ
phone: 64 4 478 6112
fax: 64 4 478 6106
email: jacauie@hague.co.nz

April 1-5, 2002
Orlando, Florida

2002 National Hurricane Conference
This annual event emphasises lessons learnt from hurricane strikes: programs for preparedness, response, and mitigation; and new and ongoing assistance programs
Contact: National Hurricane Conference
2952 Wellington Circle
Tallahassee, FL 32308
phone: 850 906 9224
fax: 850 906 9228
email: mail@hurricanmeeting.com
www.hurricanemeeting.com

April 13-17, 2002
Atlanta GA

2002 National Disaster Medical Systems (NDMS) Annual Conference
Sponsors: U.S. Department of Health and Human Services, Department of Defense, Department of Veterans Affairs, and Federal Emergency Management Agency
Contact: National Disaster Medical System
National Headquarters
12300 Twinbrook Parkway
Suite 360, Rockville MD 20857
phone: 301 443 1167
fax: 800 872 5945
email: ndms@usa.net
www.oep-ndms.dhhs.gov

April 15-17, 2002
New Orleans, Louisiana

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April 18-20, 2002
Tampa, Florida

Hemispheric Conference on Vulnerability Reduction for Populations and Settlements, Natural Resources, and Urban Lifelines and Infrastructure in Trade Corridor Development
Hosts: University of South Florida, Center for Disaster Management and Humanitarian Assistance (CDMHA); University of South Florida, Globalization Research Center; and Organization of American States (OAS), Unit for Sustainable Development and Environment.
Contact: CDMHA, University of South Florida College of Public Health - MDC-56
13201 Bruce B. Downs Boulevard
Tampa, FL 33612
phone: 813 974 2907
fax: 813 974 9980
email: cdmha@hsc.usf.edu
www.cdmha.org
-or- Stephen Bender, Director, OAS Unit for Sustainable Development and Environment
1889 F Street, N.W., Washington, DC 20006
phone: 202 458 6295
fax: 202 458 3560
email: sbender@oas.org

April 21-26, 2002
Nice, France

27th General Assembly of the European Geophysical Society
A natural hazards track is one of many available to participants in this conference. Among the sessions in that track will be flood vulnerability assessment in river basins, modeling weather hazards, landslide risk mapping, using GIS for earthquake disaster management, using historical data in hazard assessment, eruptive volcanic hazards, tsunamis and other ocean-related hazards, avalanche formation, and nonlinear studies in assessing hazard risk. Each session in the track has a separate convener; a list of the sessions and point of contact for more information about each is available at:
www.copernicus.org/EGS/egsga/nice02/programme/NHS.program.htm
Contact: EGS Office
Max-Planck-Str.13
37191 Katlenburg-Lindau, Germany
phone: 49 5556 1440
fax: 49 5556 4709
email: egs@copernicus.org
www.copernicus.org/EGS/egsga/nice02/nice02.htm
www.copernicus.org/EGS/egsga/nice02/programme/overview.htm

April 25-May 3, 2002
San Diego, California

The 25th Conference on Hurricanes and Tropical Meteorology
Sponsor: American Meteorological Society
Some of the topics to be covered will be hurricane impacts in the Americas, monsoons, ocean-atmosphere relationships, short-range and long-range predictions, and climate processes in tropical America and the eastern Pacific.
Contact: American Meteorological Society Head-quarters, 45 Beacon Street
Boston, MA 02108-3693
phone: 617 227 2425

fax: 617 742 8718
email: amsinfo@ametsoc.org
www.ametsoc.org/AMS/

April 28-May 1, 2002
Portland, Oregon

Third National Seismic Conference and Workshop on Bridges and Highways — Advances in Engineering and Technology for the Seismic Safety of Bridges in the New Millennium
Sponsored by: Federal Highway Administration, Oregon Department of Transportation, and the Washington State Department of Transportation. Organized by: Federal Highway Administration's Western Resource Center and the Multidisciplinary Center for Earthquake Engineering Research (MCEER) at the State University of New York at Buffalo.
Contact: Michael S. Higgins
Regional Manager, Eastern Region
Pure Technologies US Inc.
10015 Old Columbia Road, Suite B-215
Columbia, MD 21046
phone: 410 309 7050
fax: 410 309 7051
email: mike.higgins@soundprint.com
http://mceer.buffalo.edu/meetings/3nsc/default.asp

April 29, 2002
San Jose, California

Third Annual Conference on Fires, Floods, and Faults
Host: Collaborative for Disaster Mitigation (CDM)
Contact: Jessica Tran, Administrator, CDM
San Jose State University
One Washington Square
San Jose, CA 95192-0082
phone: 408 924 3596
fax: 408 924 4057
email: jessica.tran@sjsu.edu
www.sjsu_edu/cdm

May 9-11, 2002
Hong Kong

Long Road and Rail Tunnels
Second International Conference
Contact: Stephanie Whitham
Tunnel Management International
PO Box 452, Kempston
Bedford MK43 9Pl UK
phone: 44 0 1234 841375
fax: 44 0 1234 854756
www.itc-confrences.com

May 12-16, 2002
Bangkok, Thailand

Coastal Zone Asia-Pacific: Improving the State of the Coastal Areas
Contact: Ratana Chuenpagdee
Conference Coordinator
Virginia Institute of Marine Science
P.O. Box 1346
Gloucester Point, VA, 23062
phone: 804 684 7335
fax: 804 684 7843
email: ratana@vims.edu
www.vims.edu/czap