The Newsletter of
THE INTERNATIONAL HAZARDS PANEL
Issue No. 6, July 1990

A Panel of the Intermediate Technology Development Group

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INTERNATIONAL HAZARDS PANEL

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and incorporating the Disaster Study Group of the
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Annual Subscriptions are:

Ordinary member £10.00
Discount for students and members from developing countries £5.00
Institutional membership £20.00

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Members receive two issues of the Newsletter per year, minutes of Panel meetings and are invited to attend meetings and the annual Panel Workshop.

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GENERAL STATEMENT

The Panel exists to reduce natural and technological hazards in communities most at risk. The Panel works primarily as an information exchange and seeks to promote the transfer of knowledge and experience on disaster mitigation between scientists, academics, consultants and all those involved in disaster management.

The Panel was formed in December 1980 and is one of several Panels of the London-based Intermediate Technology Development Group founded by Dr E. Schumacher in 1965. The Panel has 124 members in 29 countries.

The Panel membership is multi-disciplinary comprising architects, anthropologists, building scientists, earth scientists, economists, engineers, geographers, lawyers, planners, risk analysts, sociologists, other social scientists and specialists in relief and development studies.

The Panel is concerned with all approaches to disaster mitigation but seeks particularly to promote preventative planning in disaster prone areas through a multi-disciplinary approach incorporating: education and action; helping communities to organise themselves; low-cost and self-help tools; and improved communication between scientists, administrators, planners and those at risk.

PANEL OBJECTIVES

1. To exchange information

The Panel seeks to provide a reference group for representatives of all disciplines, any country and any organisation with a serious interest and commitment to the understanding and adoption of risk reduction techniques in hazard prone areas. The Panel seeks to facilitate the dissemination and exchange of information and the sharing and transfer of experience on risk reduction in hazard prone areas. The Panel seeks to encourage the transfer of knowledge and experience between Panel members and especially the two-way flow of information between members in developed and developing countries.

2. To raise consciousness of, and to promote, risk reduction techniques

The Panel seeks to increase awareness and knowledge particularly of preventative risk reduction techniques, firstly amongst a) its members, b) those responsible for making investments in urban and rural development projects in disaster prone areas, and c) those living and working in disaster prone areas. Secondly, the Panel seeks to share knowledge and experience of disaster mitigation techniques amongst a) representatives of different disciplines, and b) those with different experiences of disasters and disaster mitigation.

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3. To promote mutual support between Panel members and others participating in disaster mitigation.

The Panel exists in an important part to encourage and help facilitate the mutual support of Panel members' various interests and initiatives which are designed to achieve objectives 1 and 2 above, whether they be directly promoted by the Panel or otherwise agreed by the Panel. Panel members are encouraged wherever possible to promote the Panel and to undertake initiatives agreed by Panel members in the name of the Panel.

CORPORATE RESPONSIBILITY IN AN AGE OF DeregULATION:

Lessons from the Zeebrugge ferry disaster

Peter Spooner

On the clear, still evening of 6th March 1987 the cross-Channel ferry Herald of Free Enterprise suddenly rolled over onto its side as it was leaving Zeebrugge. One hundred and ninety three people died: 345 were saved. The loss of life would have been much higher and perhaps total had not the roll on, roll off (ro-ro) ferry ended up, half submerged, on a sandbank. Even so, the bodies of most of the victims were not recovered until the vessel was raised and towed into harbour nearly six weeks later. They included the body of the author's younger son, Martin.

In retrospect, the capsize of the Herald was much more than a maritime disaster. The questions it has raised and the lessons that are being learnt from them extend far beyond the commercial transportation of passengers. They address many aspects of contemporary society. They present new challenges to corporate bodies of all kinds. They raise moral as well as legal issues. Above all, they are focussed on an issue that lies at the very heart of disaster prevention: corporate responsibility. Those concerned with such matters will wait long (and, hopefully, forever) for a more informative case-study.

More than three years after the capsize the Zeebrugge tragedy is still making history. A two-year £1 million research programme by the British Department of Transport has just officially confirmed what has long been known by navel architects - that the damage stability of ro-ro ferries falls far short of the internationally agreed target for passenger ships. Meanwhile, manslaughter charges have been brought against seven individuals and, most significantly, against the Herald's owners, P & O European Ferries.
This is only the second prosecution for corporate manslaughter in British legal history (the first, a quarter of a century ago, was dismissed). It would be both imprudent and improper for me to try to usurp the function of the court by anticipating the verdict. But there is no doubt that the issues to be considered by a jury at the Central Criminal Court in September will be of lasting interest to management and behavioural scientists as well as to the shipping industry.

Such developments owe a good deal to the campaigning activities of the Herald Families Association, a voluntary organisation formed by bereaved relatives to help one another come to terms with a tragedy that, on the evidence heard at the public inquiry and the subsequent inquest, was clearly avoidable. Family support groups of this kind are a relatively new phenomenon. I submit that they have a significant role to play in preventing disasters.

Investigation

The public inquiry mounted by the Department of transport in June 1987 found that the immediate cause of the Herald's capsize was that it had left port with its bow doors open. However, the underlying cause is even more disturbing.

The reason so many passengers and crew died is that a ro-ro ferry becomes unstable if a substantial quantity of water gets onto its undivided car deck. Officially the Herald capsized in about four minutes. For the passengers there was no warning and it was all over in 90 seconds.

Despite the alarm bells that ought to have been rung by earlier capsizes, the safety measures on the Herald, commissioned in 1980, were as primitive as those used on ocean-going liners built at the turn of the century. The vessel was festooned with traditional lifeboats which were obviously rendered useless by the rapid capsize. There was no emergency lighting to guide people in a situation where horizontals had suddenly become verticals and transverse corridors had been transformed into black chasms. Even more remarkably there was nothing on the bridge to show whether the all-important bow doors were open or shut, and the vessel's standing orders did not require positive reporting by the crew member charged with shutting them.

The corporate responsibility lesson here is self-evident. Those charged with preventing emergencies - and not just responding to them - have to do some real thinking. It is not enough to believe that systems are safe because they have worked in the past: responsibility lies in identifying what could happen. There is no evidence that the ferry company failed to meet the requirements of the Department of Transport and Lloyd's; it has also been argued that they 'fully conformed with maritime tradition'. But it is the paralysing effect of traditional thinking that is the real killer.

Analysis of major disasters all over the world reveals the same bitter message as the Zeebrugge tragedy. Maybe there were no villains, but there were plenty of fools and incompetents.

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Responsibility for keeping things up-to-date falls on all corporate bodies, including the highest in the land. The chairman of the public inquiry into the Zeebrugge tragedy declared,

'if it is the view of Parliament that the taking to sea of a ro-ro ferry with her bow or stern doors open ought to be a criminal offence, then Parliament must enact appropriate legislation'.

Parliament did so, about two months after the Herald went over. That was a knee-jerk reaction, not responsibility.

In his report the chairman of the inquiry raised an issue of equal relevance when he said,

'The underlying or cardinal faults lay higher up in the company. The board of directors did not appreciate their responsibility for the safe management of their ships... did not have any proper comprehension of what their duties are... From top to bottom the body corporate was infected with the disease of sloppiness'.

Challenging the law

The inquests on 188 victims of the capsize opened in April 1987 and were adjourned until August of that year. The Dover coroner then raised the possibility of his jury returning verdicts of 'unlawful killing'. He insisted, however, that this offence could be committed only by individuals. He therefore rejected a plea by counsel for bereaved families to call for evidence on the way the ferry company was run.

Three bereaved families went to the Divisional Court to challenge that decision. Their pleas was rejected by the three law lords but there was a tentative ruling that a corporate body could be guilty of manslaughter. The coroner's jury, kept in ignorance of all this, unanimously returned a verdict of unlawful killing on 187 of the victims (the exception was a woman who died later).

Families get together

The Herald Families Association was formed a few days before the inquests ended. Its members quickly realised that their grief and anger had to be directed into constructive channels, and that some benefit had to be extracted from the deaths of nearly 200 predominantly young people. So they set themselves two specific objectives: first, to bring about a significant improvement in the inherent stability of ro-ro ferries, and, second, to raise the issue of corporate responsibility in all its forms.

The former has taken the HFA along a slow and often frustrating path. Among other things, the association has challenged the professional integrity of the Royal Institute of Naval Architects (which has responded very responsibility); put its views direct to the Prime Minister and some of her senior ministers, repeatedly raised the issue of ferry safety in the media, and even held a somewhat dignified demonstration at the ferry terminal at Dover. It now looks as though something will be

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dome to improve the damage stability of all ro-ro ferries using British ports - but the HFA will not relax its vigilance until this actually happens.

As for its second objective, the HFA initially set itself the goal of getting the full facts of the capsize examined by a jury in a criminal court. This was a case of seeking justice, not vengeance. After much soul-searching, members became convinced that such an action was in the public interest. A criminal investigation - whatever its outcome - would be a deterrent to any company that was tempted to cut costs on public safety or give it insufficient attention. That, in turn, would clearly help to prevent future disasters.

HFA members were ready to put some real muscle behind their conviction. They pledged enough money to fund a private prosecution of the ferry company if this proved necessary. They also engaged a leading lawyer, Sir David Napley, to show that they meant business.

The need for such action receded when the Director of Public Prosecutions, following a long criminal investigation by the Kent police, issued summonses against the ferry company and seven individuals (three former directors, a senior master and three members of the Herald’s crew). Obviously it would be improper to suggest that the DPP’s decision was influenced by outside pressure; so it is purely a coincidence that the two passenger victims chosen at random as test cases were my son and the daughter of the HFA chairman, Australian-born Maurice de Finan.

A new horizon

Freed from the need to launch a private action, the HFA is able to take a much broader view of the many issues raised by the disaster that brought this association into being.

From the Joseph Rowntree Charitable Trust we have obtained a substantial grant to undertake a two-year corporate responsibility project. The aim here is to track down relevant work by other bodies, co-operate with them wherever practicable and then undertake original research of our own. We want the results of that research to reach not only the academic world but the top business-people who are in a position to ensure higher standards of concern for the health and safety of their organisations’ employees, customers and neighbours (as well as for the public at large).

We have also set up a working party, representing about ten family support groups formed in the wake of subsequent disasters, to look at the possibility of establishing a permanent body to pursue common aims.

A new morality

Governments all over the world are moving in the direction of deregulation and therefore allowing corporations to set their own standards. The cases for and against that movement could be argued at considerable length but would simply confuse the real issue. For it is the opinion of the Herald Families Association that lasting improvements in public safety will come not from

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tighter legislation (however desirable this may be) but from higher standards of corporate responsibility.

Regrettably, morality (or ethics) is a matter too often ignored by academics working in the area of disaster prevention.

It is certainly not enough for a responsible corporation to meet the minimum standards laid down by legislation. Those commercial enterprises aspiring to real market leadership must play an active role in setting standards and helping to shape future legislation. This may prove painful and costly in the short term, but there are long-term rewards for those that do it well.

Management attitudes are changing. In the 'seventies and early eighties' much emphasis was placed on the need for 'tough' management. Today there is more talk about the need for so-called 'soft values'. Tomorrow's leaders will be required to set an example of integrity that will be followed by those all the way down the line.

The Herald Families Association will campaign vigorously for that kind of responsibility. Our contribution to the growing debate may be modest, but we have a special part to play. Our aim is simply that in years to come the names 'Herald' and 'Zeebrugge' will be linked with worthwhile reforms and not just with grief and agony.

Peter Spooner is a member of the Herald Families Association where he chairs the sub-committee on corporate responsibility.

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**DISASTER VOLUNTEERS - WHAT DO WE KNOW ABOUT THEM?**

*Neil Britton*

**Introduction**

Disasters are a particularly intense form of collective stress which requires comprehensive action to be prepared for and respond to widespread disruptive and damaging consequences. Disasters are events which not only endanger the lives and livelihood of individuals and groups, they may also hasten social and economic transformations which, in extreme conditions, may jeopardise the survival of vulnerable communities. It is fortunate, therefore, that for any given locality disasters are infrequent events.

Although social routines within segments of every community will be regularly punctuated by lesser occasions such as localised
'nuisance' flooding, severe storms, structural fires, traffic accidents and the like, even in Australia's most hazard-prone locations disaster impact is the exception rather than the rule. Because of this, it is impractical for society to allocate too many resources for the sole provision of countering the consequences of disaster. In Australia, the balance between defence from the harmful effects of disaster impact and the constant push to throw caution to the wind is achieved through a network of organisations at the local, state and national government levels which can be collectively referred to as the disaster-relevant organisational network (DRON - see Britton 1984). The viability of the DRON, as with any nation's disaster management system, is dependent on one vital element: people.

People - The Vital Resource

The human resource within the disaster management system is not a uniform group. In very general terms, those who become involved in disaster-related activities can be classified into five categories. As an aside, the distinction which follows is important for pre-impact as well as post-impact actions of disaster management. The first group would be the career officers in established emergency services such as the police, fire and ambulance services, and in some countries, the armed forces. These people are regarded as the vanguard of society's response and because of this their organisations are perceived as 'lead combat authorities'. A second group is the permanent volunteers associated with agencies such as the State/Territory Emergency Services (S/TES), the Volunteer Bushfire Brigades, the Volunteer Rescue Association or the Water Rescue Brigades. A distinguishing feature of this group is that their functions are emergency or disaster-specific, and many are likely to be part of the 'lead combat' set. A third group consists of general welfare and relief associations such as the Salvation Army, the Red Cross, St Vincent de Paul, but who also have crisis welfare functions. The last two groups are less distinct. The fourth grouping is the general public which spontaneously donates money, material and other resources following the onset of publicised crises.

Finally, there is the victim group. This group is arguably the most under-estimated component of human resources available to the disaster management system. An enormous number of activities directly associated with disaster management are performed by residents of the impact area. It is obvious that none of these groups are mutually exclusive, and individuals or groups may inhabit one or more category simultaneously or serially depending on the nature of the crisis. While none of these five groups have been studied thoroughly, most is probably known about the first group - the career officers in the established emergency services.

If we do not appreciate the fundamental fact that the disaster-relevant human resource is diverse, then the full 'people' potential available to the disaster manager cannot be properly used for counter-disaster purposes whether it be before, during or after impact. Charles Fritz's (1968; Fritz & Mathewson 1957) research on convergence behaviour following disaster impact provides a useful illustration. Fritz pointed out that people who 'converge' into a disaster impact zone consisted of more than the 'gawking onlookers' most disaster managers tended to assume.
Disaster managers thought non-victim citizens were all of the same ilk because it fitted in with another strongly-held disaster organisational belief which assumed that impact-affected people were more-or-less helpless victims unable to look after themselves. An allied assumption was that only 'properly trained' people could cope under circumstances where social devastation was rife and as a consequence if untrained citizens became involved they would simply add to the victim list and exacerbate matters. As has already been mentioned, we now realise the fallacy of this sequencing and we have set about correcting the situation.

However, the real issue is that the propensity for clumping everyone who was not a 'bona fide' trained disaster rescurer under one label (that is, a 'converger'), not only inhibited disaster managers from appreciating the social dynamics of disaster, but it actually prevented managers from engaging concerned citizens practically. It therefore effectively eliminated the utilisation of a vast and potent resource. The general lesson arising from this example is that the more we understand and accept the parts which make the whole, the better we are able to utilise all the components.

While there is evidence that specific misconceptions like those described in the example above are declining, there are others which are more resilient. One of these centres on the relative merits of the so-called disaster 'professional', or the career officer and the permanent disaster volunteer.

**Career and Permanent Volunteer Disaster Personnel**

Questions concerning the role of volunteers in a disaster situation have often been raised, usually by career emergency services officers who see their positions and themselves being compromised by volunteers. While it is clear that not all career officers hold this point of view, many regard volunteers as threats to their position. In the current period of increasing government fiscal restraint and economic rationalisation this may not be quite so alarmist as it was once taken to be. Governments throughout the world are trying to reduce expenditure, and one method is to use volunteers as replacements for permanent positions. This process is known as 'coproduction', and many emergency services in particular are turning to this option. As well as matters concerning their position, career officers sometimes express the viewpoint that they are endangered by being forced to operate alongside volunteers who they believe are not as well-trained as the 'professional' emergency serviceperson. Career officers readily acknowledge that permanent volunteers undoubtedly possess the all-important qualities of commitment and enthusiasm and are dedicated to offering themselves to their local community. There is nevertheless a feeling amongst career officers that permanent volunteers do not have the prerequisite knowledge, skills, or specific training required to help protect themselves or colleagues in the field. As a counter to this, volunteers have questioned the assumption that disaster-relevant skills and knowledge are only associated with full-time employment in functionally-specific accident and emergency-oriented organisations.

No studies in Australia, at least, have been conducted to establish either the extent of these sentiments or the precision.
of them. One study, conducted by the author between 1983-1985 did enable some quantification to be made. Britton (1985) found that 36% of career S/TES officers who came up through the volunteer ranks indicated that as volunteers they felt employed officers displayed attitudes of superiority during operational periods. This rose to 41% in non-operational periods. The same study also found attitudinal variations between career personnel in the established emergency services (police, fire, ambulance) toward the S/TES officers. Specifically, 46% of respondents in the S/TES felt the role of their organisation was not understood by other agencies, and 50% declared the S/TES role was not readily accepted by other organisations. The significance of the latter figures is that the S/TES is a predominantly volunteer organisation while the others are more-or-less exclusively staffed by salaried career officers.

Thus, the two-tier disaster scheme operating in Australia, in which one tier comprises the local community volunteer base, and the second tier containing a paid 'professional' emergency and disaster nucleus is, by all accounts a fractioned system. Volunteers and career officers are brought uneasily together on the premise that the established emergency service organisations provide most of the guidance, training and co-ordination of action for the volunteer groups.

The Significance of the Permanent Volunteer within the Australian Disaster Management System

The various claims and counter-claims about the merits of careerism versus voluntarism miss the actuality of Australia's disaster management structure. A fundamental factor gleaned from a study of Australia's disaster management system is the overwhelming dependence on the principle of 'self-help' and hence on volunteers. It has been estimated that about 400,000 Australians are permanent volunteers for agencies such as the S/TES, Country or Bushfire Brigades, Water Rescue Brigades, and St John Ambulance. This figure can be compared with the approximately 60,400 paid career officers located mainly in state and federal agencies such as Ambulance, Fire and Police Services, and S/TES (Australian Bureau of Statistics, 1989). This suggests that between 2 - 3% of the Australian population are permanent volunteers with emergency and disaster training. Thus, the permanent volunteer component comprises about 87% of the total estimated regular trained IRN membership.

While career officers within the emergency services network are able to meet the everyday requirements of accident and emergency intervention, the human resource is insufficient to adequately cope with prolonged large-scale disruption typified by disaster. This is particularly the case in rural Australia and at the urban-rural interface. Thus, superimposed on any specifications set out in the various acts and regulations which administer the established emergency services is an espoused philosophy upon which the Australian counter-disaster system is based. This is the principle of self-help. This philosophy is based on the premise that the public is willing to accept some personal responsibility for their own safety and well-being, and will adopt actions aimed at reducing the effects of disaster. This self-help philosophy is epitomised by the permanent disaster volunteer. Within this framework the full-time, paid career

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officers within the DRON are dependent on volunteers during mass emergencies and disaster.

In addition to the numerical importance of the permanent volunteer to the Australian DRON, there is a significant transfer of volunteers to full-time paid appointments in some agencies. Research conducted on the S/TES has found that 37% of career S/TES officers held a volunteer post prior to their paid full-time position. Further, many permanent volunteers have a tendency to move between emergency service organisations or else are active in more than one disaster-relevant agency. Correy (1989) for example, in his study of selected brigades within the New South Wales Volunteer Bushfire Brigade found a substantial proportion of respondents were either past members (22.8%) or current members (6.5%) of other emergency services.

From an economic perspective the impact of the permanent volunteer aggregate is extremely important. The current head of a state volunteer bushfire fire brigade was recently quoted as stating it would cost an additional A$ 300 million in annual wages alone to replace a quarter of its volunteer members with career officers. This would require the agency’s annual budget to be increased 25.8 times just to absorb that portion of the wages ‘bill’! In another case relating to a predominantly volunteer organisation, the ratio of volunteer-to-permanent officers is around 200:1, enabling the state government to operate the service at a cost of just over A$ 4 million (this specific agency is subsidised by local and commonwealth government funds as well). Recent estimates show that if the time and direct expenses were recompensed on a ‘paid call’ basis, the cost to the government would be in excess of A$ 27 million (further details of these cases are available in Britton et al., 1990).

It is clear that while the overall responsibility and authority for disaster management clearly resides with the established emergency services, the backbone of counter-disaster in Australia is the volunteer system.

**Some Specific Features of the Permanent Disaster Volunteer**

In order to learn more about permanent disaster volunteerism in the Australian disaster management system, members of the Disaster Management Studies Centre are currently undertaking a large-scale research project. The purpose of the study is to develop strategies which will enhance the effectiveness of human resources management in the Australian emergency disaster organisational context.

We have already identified that permanent disaster volunteers are atypical volunteers. When compared with what is known about the activities of most volunteers or of voluntary agencies in general, permanent disaster volunteers appear to be an 'outlier' group for two main reasons (Britton 1990; Britton et al., 1990):

1. Most volunteers do not pursue actions in extreme stress-generating environments and the vast majority of volunteers are not exposed to stress-producing situations that have the potential to put their lives at severe risk, even death. Permanent disaster volunteers, by comparison, do face a stressful environment which has a higher probability of

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injuring them, emotionally and/or physically, or worse, and which is an enduring ‘occupational’ hazard.

(ii) While all organisational forms exhibit regularities of patterned behaviour, there are clear differences between the looser arrangement of voluntary associations and the rigid formalisation of behaviour found in bureaucracies and most other complex organisations. Permanent disaster volunteers function within a hybrid organisation. They operate within a distinctly bureaucratic organisational framework controlled by paid full-time career administrators and career emergency officers. Continued active membership of the permanent volunteer is conditional upon adherence to bureaucratic regulations, rigid training requirements, and other patterns of behaviours that are pre-determined by others.

Little practical material is available dealing with the management of volunteers as a specific emergency worker group. Whereas there have been studies on particular types of volunteering behaviour, such as bystander intervention, little attention has been given to the role of the permanent disaster worker in the context of social crisis. Studies have been conducted which explore the personality profile of professional emergency workers such as police, ambulance and fire officers, but there are few studies focusing directly on the permanent volunteer. Given the reliance the disaster management system has on volunteers, this imbalance in the research is, in our view, unacceptable. We hope our work will in some way redress this.

References


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REPORT FROM AN SES VOLUNTEER

Andrew Bowman

There has been a long and commendable tradition of community self help in Australia. Natural disasters stimulated people to work together to respond to them. This was a simple survival mechanism. Before rural fire brigade networks were established and funded from an administrative centre, people responded ad hoc to fires and emergencies.

The idea of the rural fire brigades operating under the aegis of a central body such as the CFA (Country Fire Authority) in Victoria is a very good one. It provides a network of skilled and trained people who are equipped to respond appropriately to fires. Similarly the State Emergency Service provides a rescue system for road accidents and other community emergencies, ranging from bush, cliff and snow searches and rescues to disasters such as floods.

There is an overlap of the function provided by the volunteer organisations and the paid professionals. In any emergency the CFA, the ambulance service and the conservation forest and lands services, among others, may be involved, although the police are given overall authority. Inevitably there is jealousy and jockeying between the services. As each organisation or its members hopes to get a share of the 'action'.

Rescue service territoriality

I have been involved in two rescues that epitomise this problem. The first was in 1988 when a hang glider pilot launched himself

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off a mountain top without clipping into his glider. He fell from his glider onto the brink of a cliff, then tumbled down the cliff to rest seriously injured but providentially snagged on a tree. In Corryong the local SES (State Emergency Service) contains a mountain rescue group. The local SES coordinator specifically recruited people in the district that he knew had appropriate skills. So in this case the volunteer recruitment process matched a perceived need.

After the alarm was raised I was tracked down with another of the district’s climbers. We were rushed up to the mountain. Somehow local volunteers and an ambulance officer had courageously descended the cliff following lines of weakness and swarming down hemp ropes.

On the advice of a doctor we effected the rescue in the dark using my equipment with the groups. Meanwhile the official network swung into action. The police search and rescue unit was mobilised, but as they had been involved in a rescue elsewhere they were delayed. The rescue was effected with minimal equipment. The desperately sick hang-glider pilot was driven the 30 kilometres to the local airfield. As he was about to be flown out the police search and rescue squad arrived. They were unimpressed that their professional act had been usurped. Not that they said anything directly but this was the impression conveyed. Prior to us getting the pilot off the cliff the police safety and rescue radioed through instructing us not to act. It was the doctor’s judgement that we should.

This rescue showed the advantages of capable local groups. The concept is a credit to Bruce Meek the local SES leader.

The second rescue had a less happy outcome. I came home from an interstate trip to be told that there was a call out and would I be ready to meet at the HQ at 3.30am. Being ready meant having a pack with food and equipment for up to three days, and with skiing gear. We drove to Mount Beauty getting there at 7.30am. There we met in a shelter area - to be ignored. There was no food, no information other than rumour and the inevitable conjecture. The huge police helicopter flew up and down gullies, while the SES volunteers waited like poor hand-maidens. Finally when the powers that were decided to convene, information and duties were eked out. There was a very real sense that the volunteers were not as significant to the search and rescue process as the professionals. However it was the SES skiers who found the body. The senior officers dripping in braid flying in the helicopter did not appear to have any impact on the outcome of the search.

The moral of both of these experiences was that the local expert volunteers can provide almost immediate response. They can have groups if they are appropriately recruited composed of expert practitioners in various outdoor activities, which combined with local knowledge can be invaluable.

Maintaining interest

The problem with any organisation that is set up to cope with particular emergencies is the problem of a peacetime army: trained and equipped but unneeded. There is a risk that membership will

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fall as a consequence of boredom or apathy. Volunteer organisations work best when they are busy fulfilling their mission. When they are not occupied in this way many people become uninterested in the organisation and its routine demands of training, meetings and fundraising.

The problems of apathy are the same for people who are peacetime soldiers or volunteer firefighters or SES volunteers. They are not just motivated by altruism. Either they have specific skills that may be useful to the organisation or they have a world view that involvement in the organisation confirms or satisfies: that the world is a menacing place. Alternatively, through membership of the group they gain some social cachet.

In remote areas it is necessary for a group like the SES to exist because the only professional trained emergency workers are the police and the ambulance service and their resources can be stretched very thin. The SES provides a useful means of overcoming that shortfall of trained personnel.

The social organisation of volunteer groups

There is no process for selection for involvement with the SES or CFA. Anyone who is interested may join: the selection process is no more rigorous than the selection process involved in joining a tennis or football club.

There must be a rich field of sociological study to determine what personality types are attracted to these organisations. In any country town it would be found that much more volunteer time and energy would be directed to football clubs or service clubs such as Rotary, Apex or Lions, than to the Fire Brigade or the SES. The division between the CFA and the SES membership would give further insight into social division and organisation. Essentially the two groups have specific membership bases.

In my involvement with the CFA I found that the group hierarchy was a reflection of perceived community status. The group’s hierarchy was dominated by members of families long established in the district. Newcomers to the district who wanted to fulfil some obligation by joining the fire brigade would find training nights were a travail of exclusion while the brigade caption polished ‘his’ equipment. The notion of equalitarian cooperation suffers a serious blow in the face of such tight social organisation.

Fire in the Australian countryside represents a potent natural force. It is of all the natural disasters the one that appears to be most controllable. Control is the core of all social groupings. Fire brigades and fire prevention officers have a great deal of social power and can condemn non conformists as being in possession of a fire hazard. Newcomers or weekenders with rank grass around their properties are censured. Although often locals and farmers have equally long grass in their paddocks, the inconsistency isn’t seen. For the grass in a paddock is not a symbol of neglect but a representation of wealth: grass within a farmer’s fences is fodder. Whereas grass on a weekender’s, or a newcomer’s property is not justifiable as stock feed.

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The tight social and employment groupings that are replicated in the CFA brigades seem not to be as firm in the SES.

In my experience the two organisations are separate in their sources of recruitment. The SES seems to be drawing on a different group. As the state government requires that the SES groups have a small group of personnel trained to operate equipment the nature of the SES will tend to resolve itself to groups of skilled personnel whereas the fire brigades will still be a more socially powerful group as its role is to contend with a specific menace which has an almost mythic quality in Australian rural life.

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THE NEWCASTLE EARTHQUAKE, 28 DECEMBER 1989

Earthquakes in Australia

There has been a long held perception in Australia, and shared in many other countries, that Australia is a "stable" continent, and, as such, does not experience earthquakes. This myth was totally shattered on the 28 December, 1989, with the occurrence of the devastating and fatal Newcastle earthquake.

It is ironical that earthquakes have long been an integral part of Australia's history - the first reported occurred a couple of months after the initial European settlement at Botany Bay in 1788 - with several major ones (of Richter magnitudes 7.0 greater than 6.0) having occurred since. Despite this available historical record, little has been achieved in terms of preparedness and consequently preparedness for such natural disasters.

It is most probable that the "stability" myth has, in part, been related to the tectonic setting of Australia. In terms of the well-recognized "Plate-Tectonic" model as an explanation for the observed crustal features of the Earth, Australia is an island continent within the Indo-Australian Plate. The continent is drifting northwards away from the spreading margin near Antarctica towards the Indonesian Arc at the rate of about 7 cm per year. As a consequence, Australia is considered a high stress regime whereby the release of such stress is manifested by infrequent (compared to the plate margin areas like the San Andreas Fault in California) intra-plate, or continental, earthquakes.

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In the 202 years since European settlement, several thousand earthquakes ranging from microearthquakes (ML 0.0) to major events (ML 7.0) are known to have occurred. The most recent map of earthquake epicentres is shown in Figure 1. Unlike the well-known active areas of California, New Zealand, etc., no definitive spatial trends can be discerned. The majority of earthquakes have occurred in seven loosely defined regions across the continent: Central Australia (Simpson Desert); southwest corner (near Perth); north of Adelaide; northwestern parts (Canning Basin); Sydney-Canberra area; to the north of Brisbane; southeastern parts (Bass Strait).

More than 200 earthquakes have had their effects felt by the local populace, some of these having caused considerable damage - for example:

1954 Adelaide (SA) ML 5.3 considerable damage to property around Adelaide and environs; insurance claims of A$0.5M

1968 Meckering (WA) ML 6.9 devastated the small town of Meckering and caused some damage in Perth.

1973 Picton (NSW) ML 5.5 damage in the Sydney area; insurance claims of A$0.5M.

1979 Cadoux (WA) ML 6.2 considerable damage to the small town of Cadoux.

The areas over which the effects of these intra-plate earthquakes are experienced are at least an order of magnitude greater than for an equivalent-sized plate margin-type earthquakes. As an example, consider the 1918 "Queensland" earthquake which was felt over an area of more than 300,000 sq km.

And what of earthquake risk? At present, Australia operates under the Standards Association Earthquake Code AS2121-1979. New probabilistic risk maps (in terms of peak ground motion acceleration, velocity, and intensity) have recently been compiled by Gaull et al (1990), an example of which is shown in Figure 2. These are a vast improvement on AS2121-1979 as they employ the most comprehensive earthquake catalogue and most recent risk calculation methods.

The fragility of the currently employed probabilistic risk estimates has, however, been clearly borne out by the 1989 Newcastle earthquake - a region with little documented seismic history and consequently of "negligable" risk based on AS2121-1979. There is surely a necessity to employ not only the earthquake catalogue but also geological and other qualitative information in risk estimation. The need for a revision of the present Code has been recognized and is currently in progress.

**The 1989 Newcastle Earthquake**

At 10.27 a.m. on Thursday, 28 December, 1989 (local time) the cities of Newcastle and Lake Macquarie and their environs were devastated by a moderately-sized (in seismological terms) ML 5.6 earthquake. This was the first time in Australia’s history that...
Figure 1. Earthquake epicentres in Australia 1859-1988 with ML ≥ 4.0; Bureau of Mineral Resources, Canberra, Australian Earthquake Data File (from Gaull et al 1990).

Figure 2. Probabilistic earthquake risk map of Australia in terms of peak ground acceleration (mSec⁻²) with a 10% probability of being exceeded in a 50 year period (from Gaull et al, 1990).

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fatalities had occurred from an earthquake: 12 lives were lost and more than 160 people were injured. The subsequent total damage bill has been estimated at A$3 - 4 billion, by far the costliest natural disaster to befall Australia.

This earthquake has completely changed perception of the Australian earthquake hazard. Detailed research programs have been initiated at the University of Queensland Earthquake Research Unit (multidisciplinary approach involving seismology, geology, engineering, insurance, sociology and disaster planning and management) and several institutions in Newcastle (engineering, sociology, local government).

The seismological parameters, given in detail by McCue et al (1990) are:

Origin time : 23:26:58 hours UT
Epicentre : 32.95°S, 151.61°E; Near Boolaroo about 15 km WSW of the City of Newcastle
Focal depth : 11 km
Richter magnitude : ML 5.6
Aftershocks : 29 December 1989 09:06 hours UT ML 2.7
27 February 1990 13:43 hours UT ML 2.5

A study of historic activity shows that two significant earthquakes occurred in 1868 and 1925, both having magnitudes ML 5.0 - 5.5 and both causing some damage in the Newcastle area. Many other smaller events (ML x 4.0) have been located in the region since the establishment of the south-eastern Australia network of seismographs in 1958.

Detailed research is currently in progress at ERU. The preliminary results (Rynn, 1990; Brennan, 1990) point to many important lessons that must be learnt from such a moderately-sized earthquake striking a highly developed and populated continental region. Of great interest was the large area over which the earthquake’s effects were felt - more than 200,000 sq km (Figure 3). The area of damage (Modified Macalli intensities MM V to VIII) extended over 9000 sq km from the Newcastle area south to Sydney (140 km distant), northwest to Scone (145 km) and north to Kempsey (320 km). More than 50,000 buildings are known to be damaged. The insured loss stands at more than A$1 billion with an estimated total loss of A$3-4 billion.

Other important observations and results include the long duration of shaking of up to 42 seconds, the large proportion of long period energy observed on the seismograms, several reports of high frequency vibrations felt by ships at sea, the initial damage to some lifelines and the still-continuing sociological effects of this disastrous event.

It is becoming clear that a major influence in the engineering effects relates to geological controls of the areas of wet sediments in this part of eastern Australia (Brennan, 1990). Most of the damage within 100-200 km of Newcastle and the felt effects at greater distances can be directly related to the development on sedimentary sequences. It is considered that there may have been liquefication of sediments (although no direct evidence was observed), and that there was most probably

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amplification of the seismic waves at the surface of the Earth, similar to effects reported for the 1985 Mexico earthquake.

The lessons learnt from this Newcastle earthquake are being transformed into a prognosis for future potential earthquakes in eastern Australia (Rynn, 1990). While we cannot predict earthquakes nor prevent their occurrences, we must reinstate a program of awareness, preparedness, research and education for future generations - this must be undertaken by a multidisciplinary approach. The consequent results will be of great value to all such continental regimes on Planet Earth.

**Figure 3.** Preliminary isoseismal maps for the 1989 Newcastle earthquake. Roman numerals indicate level of shaking on the Modified Mercalli Scale of Intensity (from Rynn, unpublished data, 1990).

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BUILDING PERFORMANCE IN THE NEWCASTLE EARTHQUAKE

With the permission of the author, the Editor has extracted the 
following from an Interim Report on the Newcastle Earthquake by 
George Walker. The interim report deals with building damage. It 
was based on a combination of personal damage inspection and 
discussions with many people on the earthquake, the pattern of 
damage and its implications. Since the interim report was 
released the Institution of Engineers (Australia) has published a 
more comprehensive document on the earthquake.

Characteristics of Building Damage

Estimates of the value of building damage have ranged up to well 
in excess of a billion dollars. However it is common for damage 
losses to be exaggerated in the immediate aftermath of the event. 
The actual value of building damage is probably in the range of 
200 to 300 million dollars. Significant other losses include 
business losses due to the disruption to commercial activity, and 
damage to contents. Actual costs to the insurance industry may be

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inflated above this estimate due to replacement insurance, as opposed to indemnity insurance [actual value], being relatively common. Insured losses, expressed as a loss ratio for the Newcastle region appear to be of the order of three to four percent.

Almost all major damage to buildings was associated with unreinforced masonry construction. Minor damage occurred to both masonry construction and internal linings of light timber framed construction. In this context major damage refers to collapse, or deformation of sufficient severity as to require demolition of all or part of the building or major repairs. Notwithstanding this, large numbers of unreinforced masonry structures varying in size from houses to multistoried apartment and commercial buildings performed well, even in many cases when founded on alluvium.

No significant damage appears to have occurred to the main structural frame of steel and concrete buildings utilising a moment resisting frame to support the roof, floors and walls. Very little major damage occurred to timber buildings, and only a small amount, mainly to the masonry, to brick veneer construction.

Most of the major building damage can be classified as follows:

- major structural collapse;
- parapet failure;
- corner failures;
- transverse panel failures;
- racking failures;
- torsional failures;
- consequential failures.

**Major structural Collapse**

Major structural collapse in this context refers to collapse of floors or roof, normally as a result of the failure of their supporting structure. Only a handful of structures suffered this level of failure.

The most dramatic collapse was that of the relatively modern Workers Club building which led to the death of 8 people. It is understood that the coroner has ordered a detailed investigation of the cause of this failure. Reports suggest that collapse of the roof may have been initiated by collapse of a supporting unreinforced masonry wall, and that the floors collapsed as a consequence of this.

The other cases of this type of damage appear to have been all old structures where collapse of supporting unreinforced masonry walls led to roof collapse.

**Corner Failures**

Corner failures are vertical cracks in masonry occurring near corners or ends of brick walls. They can lead to instability of the adjacent brickwork and subsequent collapse of walls and supported structure. In Newcastle corner failures accounted for most of the structural damage to unreinforced masonry structures which was of a sufficient severity to cause concern about the
structural safety of the buildings. [This is a typical pattern]. Structures affected in this way included houses, commercial buildings, and a number of churches.

Transverse Panel Failures

A transverse panel failure is the failure of a wall panel in bending under transverse loads. In earthquakes transverse loads are imposed on walls at right angles to the direction of motion. Characteristic failure patterns are a combination of diagonal cracks from corners and interior horizontal or vertical cracks. Depending on the severity and duration of the earthquake transverse panel failures may lead to wall collapses. Internal walls are just as vulnerable to transverse panel failures as external walls.

Some brick clad framed buildings suffered collapse of sections of their outer brick skin due to transverse forces. As with corner failures in this type of building these failures could generally be traced to inadequacies of the brick ties.

One of the more worrying features of the overall earthquake damage was the number of transverse wall failures in modern construction. A significant number of these occurred in brickwork in-fill unreinforced masonry panels in moment resisting steel and concrete framed structures. Modern trends for larger spans and open spaces within buildings have led to more flexible structures in some cases, which means that the buildings move more. This can impose higher loads on the walls. The same trends have led to more slender walls which increases their vulnerability to transverse loads. In addition these walls are often constructed in a way which adds to their vulnerability. Indeed it appears to be not uncommon for very minimal connections to be used for the connection of panels to the frame along their side edges.

Although no collapses of these walls are known to have resulted from these failures, a number of walls were left in a potentially dangerous condition, necessitating removal and reconstruction. Some of these failures were observed in critical structures in respect of post disaster activities, and in structures such as schools where collapsing masonry has the potential to cause significant loss of life.

Implications of the Damage

The Newcastle earthquake and the damage it caused has implications for building codes and regulations, building research, the education of structural engineers and the building industry in general, the insurance industry, the preservation of heritage buildings, counter disaster planning and earthquake recording.

There will be debate about the extent to which the Newcastle earthquake caused life-threatening damage to buildings complying with modern building regulations. In the opinion of the author the collapse of the relatively modern section of the Workers Club, the serious torsional damage to two modern buildings previously described, and the level of transverse panel failures in modern construction, suggest that it did. If this is so then if the return period of the earthquake was of the order of a thousand years or less then there are implications for building
regulations. In the author’s opinion it would be not unreasonable to assume that the average return period of such an event in the Newcastle area is between 200 and 500 years. If this is so then earthquakes do need to be taken into account in the Newcastle area.

Until very recently only regulations in Western Australia and South Australia require earthquakes to be taken into account in the design of buildings. This reflected the low perceived risk of earthquakes in the Australian community at large. However the new Building Code of Australia which is currently forming the basis of revisions of state building regulations throughout the country does [take earth quakes into account so New South Wales would have appropriate building regulations] even if the Newcastle earthquake had not occurred.

>Detailed examination of the earthquake risk] could lead to the conclusion that structures considered special in regard to performance during an earthquake - eg those required for post-disaster functions such as hospitals, police stations, fire stations, and telephone exchanges, those used for public assembly such as schools and auditoriums, and those associated with life-line functions such as transportation, and water, electricity and gas supplies - should [receive special designation].

It is also not clear how strictly earthquake requirements are currently applied where they are supposedly required by the building regulations. It seems they may be applied to unreinforced masonry structures but not to unreinforced masonry elements in structures with ductile moment resisting frames. The Newcastle earthquake demonstrated that such an approach is inadequate.

It must also be noted that [the relevant Australian building standard] specifically excludes domestic housing from its application. Modern housing performed relatively well in Newcastle. But this may have been because it is largely brick veneer construction, which is known to perform well in earthquakes, and is largely located away from the alluvial areas where maximum ground accelerations were experienced.

One of the issues that will probably not be addressed by [the Australian Standards Sub-Committee] is whether there should be requirements which old buildings must meet. In some parts of the world regulations have been put in place requiring all construction to meet the code criteria by a certain date. Experience in respect of tropical cyclone areas suggests the risks would have to be much greater to warrant action in regard to this [in Newcastle] at building regulation level.

Building Research

The apparent influence of ground conditions on the behaviour of buildings suggests this could be another fruitful area of research. Identification of the important factors, and mapping of the areas where ground conditions could produce significant amplification of building response would be an essential prerequisite to vulnerability assessment. A special problem in respect of Newcastle, but which also has relevance to other localities, is the influence if any of the labyrinth of

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underground mine workings under the city. This may be a worthwhile subject of research, including the possibility of creep subsidence triggered by the earthquake causing continuing ground deformation and building deformation.

The apparent problems with brick ties also warrant more detailed research, as do techniques for repairing and upgrading existing structures, particularly unreinforced masonry structures and structural elements. The latter is of particular relevance to heritage structures, the importance of which has been highlighted by the Newcastle earthquake.

Research is not only valuable for its direct results. It is also valuable for its role in producing a core of expertise that can be called upon when codes need revising, special structures need designing, and disasters strike.

Heritage Buildings

Newcastle is a city with a relatively large number of old buildings which contribute significantly to the character of the city. Unfortunately many of these buildings are of unreinforced masonry and are located in the alluvial areas, and as a consequence suffered considerable damage.

Many of these buildings were close to the end of their economic life. Where major damage has been sustained the best policy on economic grounds is demolition and replacement with more modern structures better fitted for modern living. In some cases the cost of repair may well exceed the cost of replacement, and may exceed by several times the commercial value of the building itself.

This has created considerable tensions in the community due to the opposition to such policies by those who value the contribution these buildings make to the heritage of Newcastle. Unfortunately the immediate aftermath of a disaster, when key city officials should be devoting all their efforts to getting the city safe and working again, is not the best time for debating these issues. Heritage organisations will need to study what has happened in Newcastle and in conjunction with local authorities devise agreed guidelines for handling such situations should they arise in the future.

Counter Disaster Planning

The Newcastle earthquake is the first major earthquake disaster experienced within the lifetime of Australia’s current counter disaster system. It has demonstrated that there are particular problems which arise in earthquakes for which experience with other hazards does not provide a reasonable guide. In Newcastle these problems were dealt with on an ad hoc basis, there being no other alternative. There is a need for counter disaster organisations to study the Newcastle response and incorporate the lessons into their plans.

The Newcastle earthquake showed that structural safety is a dominant factor in the management of counter disaster measures after an earthquake. It is not just a matter of rescuing those trapped by collapsing structures, removing debris from the

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streets, getting basic services restored, and providing relief to the injured and homeless, as it is with wind damage. To all this is added the overriding problem that every building must be considered structurally unsafe until inspected and determined otherwise. If the building or parts of the building are considered unsafe then there is the problem of making it safe before the surrounding area can be considered safe for use.

It has been suggested for instance that there should be a structural engineering unit in State Emergency Service groups with special training in assessing the safety of damage buildings and the measures required to temporarily make safe the unsafe.

There may also be a need to examine the powers available in emergency situations to ensure that the power to make unsafe buildings safe is in the hands of the counter disaster organisation, so that speedy restoration of services and access can be made. It may also be useful to consider whether a small triage committee should be part of the counter disaster plan to make decisions on the priorities to be allocated in respect of initial inspections for safety and making safe the unsafe buildings to ensure an orderly and efficient restoration of services and access, bearing in mind the overall priorities of the communities.

Concluding Remarks

This is an interim report. It has been written as a contribution to the various discussions which need to take place before a consensus emerges on the conclusions to be drawn on the significance of the earthquake for different sectors of the community. Specific conclusions and recommendations are therefore not appropriate to this report.

Prior to the Newcastle earthquake there was a common perception that in many parts of Australia, including the most densely populated areas, the earthquake risk was insignificant. The Newcastle earthquake has demonstrated this perception to be wrong. Earthquakes can occur anywhere and planning needs to recognise this, even if for normal buildings on firm ground the risk may be deemed too low for special measures to be taken in their construction.

Dr George Walker is Deputy Head of the CSIRO Division of Building Construction and Engineering, and is a Panel Member.
THE TROPICAL CYCLONE HAZARD IN THE SOUTHWEST PACIFIC

John Oliver

Hazards in the Southwest Pacific

The island nations of the Southwest Pacific and Papua New Guinea are particularly at risk from and vulnerable to natural hazards. Potentially these include tropical cyclones, earthquakes, volcanic eruptions, mud and landslides, tsunamis, floods, severe local storms including tornadoes, droughts and wildfires.

For most of the islands, however, except those between the Equator and latitude 5°S, the tropical cyclone is the most frequent and cumulatively the greatest cause of social and economic disruption. Most of the islands are liable to the effects of the high level of tectonic instability characterising the Pacific Rim, but the impact of earthquakes or volcanic eruptions is more localised than that from a tropical cyclone, which can be severe over many hundreds of square kilometres, and the risk for an individual island from earthquakes is relatively low. Also cyclones are mobile hazards, with destructive effects extending 50-100km or more from the eye wall but likely to extend along their oceanic tracks up to several hundred kilometres. Despite the wide scatter of islands in the Southwest Pacific, several islands can suffer from an individual cyclone as it moves, often somewhat erratically, and persists for several days.

There has been a significant improvement during the 1980s in the awareness by Pacific island governments of natural threats and their widespread consequences, which in turn, with the help of international, regional or bilateral encouragement, has stimulated useful advances in disaster planning and management. Disaster legislation has been enacted in many countries, disaster plans have been drafted and response systems, infrastructure and resources established. There is still, however, a need to sharpen and strengthen the response to disasters at all the stages from prevention, preparedness, mitigation and emergency response to rehabilitation and recovery. "If we could begin to apply what we actually know of mitigation on a global basis, within a very few years we could reduce human and property losses substantially" (Press, 1988 p.26).

All-hazard versus management of specific hazards

With the progress of disaster studies in recent years, it has become increasingly apparent that there are underlying aspects of both environmental and technological extremes that call on similar patterns and methods of government or community response. This has given rise to the concept of an "all-hazards" approach as a basis for disaster management. It is, of course, sensible to avoid artificial distinctions between different types of disaster where the most effective and efficient responses to them will be provided by similar forms of planning or action. This can help to avoid wasteful duplication of response efforts. However, it is also apparent that individual types, or groups, of hazards are likely to have some unique features which require specific approaches in planning and management, in addition to the

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application of the concepts and responses common to all disaster situations.

The present outlook in many disaster studies has emphasized the importance of considering the underlying fundamentals. This has resulted in the criticism that too much disaster research has focused on the individual hazard agents and upon 'case studies', events occurring in specific regions. This viewpoint has a lot to support it, but in practical terms, for given societies or areas, it is often the case that a particular threat demands priority consideration. This focuses the main effort on what are judged to be the dominant risks. Such a policy may be needed especially where disaster planning competes with other demands on limited national economic resources and skills.

Returning to the Southwest Pacific situation, the natural hazard threat is much greater at the present time than that arising from human activity or technology. Urban centres are few in number, small in size, and relatively less sophisticated than in more developed areas, industrial activity is on a small scale, except for a few mining ventures, and transport and communication systems less complex. It is argued here that the tropical cyclone hazard is the major concern (except for Nauru, Kiribati, Tuvalu, Tokelau, the Northern Cook Islands and much of Papua New Guinea, apart from the North Solomons, Milne Bay and the southeast coast of New Britain) with the Fiji-Vanuatu area experiencing the highest frequency. The cyclone threat should therefore receive the most attention by government and non-government bodies within the countries and by external donor organisations or countries. Britton (1986, p.18) has observed the recent growth of such an awareness in the South Pacific cyclone belt.

The complex and interrelated character of cyclone impact

The consequences of a severe tropical cyclone upon an island country can be overwhelming. The magnitude of total damages is accentuated when they are related to small, fragile economies. A tropical cyclone is a complex natural hazard since it combines extremes of wind strength and rainfall intensity and amount, together with storm surges and destructive waves on low-lying coastal sections. A complex variety and incidence of disruption results. Islands are particularly vulnerable because, unlike the coastal fringes of large land areas, there is exposure from all directions.

The impact of high, gusting winds, often armed with debris, causes widespread structural damage and forest and crop devastation with far-reaching economic and social consequences. In addition there is psychological stress as well as the threat to human safety or life. Tropical cyclones in the Southwest Pacific do not cause high loss of life (except where fishing or other boats may be lost at sea or where landslips or severe floods, including storm surges, occur on land) nor do they usually cause large numbers of severe injuries. Problems arising from the wind hazard include food shortages, both for rural and urban areas, where subsistence root crops and fruit trees (pawpaw, breadfruit and bananas) or export cash crops are devastated, particularly where damage to coconut palms can seriously diminish copra production. Near coasts, water supply (often a critical problem after a cyclone) is frequently contaminated by salt spray or
Debris often temporarily blocks airfields or impedes road movement (for instance in Savai'i and Upolu, Western Samoa after cyclone 'Ofa', February 1990) at a time when it is vitally necessary immediately following a cyclone. Debris clearance becomes a high priority matter but may be difficult if heavy equipment is deficient. Overhead power and telephone lines and radio aerials are particularly vulnerable.

The scale and diversity of disruption is accentuated by the heavy rain which usually (but not in all cases) accompanies a cyclone. River floodplains are likely to be inundated, roads washed away and river banks and soil cover eroded, causing losses of agricultural land. Landslips, arising on steep slopes if the sub-soil becomes waterlogged and there has been deforestation, can carry away crops or trees and bury agricultural land or even villages in mud or sediment (such as the submergence by mud of rice crops on the Guadalcanal lowlands from cyclone 'Namu' in May 1986). Bridges may well collapse under the weight of tree trunks and other debris brought down by high velocity flood run-off. The passage of a cyclone is often followed by a day or days of continual rain which not only causes damage to the contents of damaged buildings but delays the drying out of flooded or waterlogged areas.

A storm-surge often accompanies a deep cyclone. Along low-lying coasts (where island settlement and activity is often concentrated), unless well protected by fringing coral reefs, a surge which occurs close to or at high tide and is increased by high waves can cause complete and extensive destruction. The extent of inland penetration varies but often does not exceed a kilometre or two, but on occasions the sea has washed completely over low-lying coral atolls, as occurred for instance in cyclone 'Ofa', over Atafu and Nukunonu (two of the three Tokelau atolls). This situation is particularly life threatening. Under the combined assault of the surge and waves buildings may be swept away or battered to pieces, sea walls, wharfs and port installations wrecked or land vegetation washed away or damaged by salt water. When the sea water drains away it can cause serious erosion or it may remain ponded in depressions causing health problems and mosquito plagues. Severe beach erosion, together with the effect of destructive seas upon hotel buildings and facilities, can cause serious losses in tourism, which is critical where it provides much needed overseas earnings. Sediments can be washed over coral reefs (inhibiting their growth), and into harbours, where it may impede navigation, or adversely affect coastal fisheries. The boats and equipment of fishing communities may well be washed inland or swept out to sea.

The purpose here is not to provide a detailed or exhaustive survey of cyclone impact, but to emphasize its extensive and intrusive influence for so many facets of national and community life. The potential for cyclone impact in so many varied ways contributes to the great difficulties of post-cyclone damage assessment, already a problem in widely scattered, isolated communities poorly linked with a national operations centre. The diversity of the problems demanding attention is increased by the fact that rarely are two cyclones entirely alike in their behaviour. Each cyclone event is likely to produce a different mix of effects. In any case the response system for a tropical cyclone, and the community education and warning policy
appropriate, reflects the specific characteristics of the hazard. In 1985 Vanuatu, Fiji and Tonga experienced an unusually threatening cyclone season which stimulated a review of their disaster plans. UNDRO NEWS (July/August 1986, p.15) observed that

'given that the only predictable and consistent thing about tropical cyclones is that the lessons learnt are bound to be different every time... in archipelagos with scattered populations and limited logistical resources a tropical cyclone is highly difficult to deal with'.

Climatological variability in cyclone behaviour

There are further distinctive aspects of tropical cyclones. The threat they pose changes over time. Cyclone climatology shows varying frequency of occurrence in a given cyclone-prone region. Table 1 illustrates the Southwest Pacific experiences over the 1980/81 to 1988/89 seasons. Short runs of years can be cyclone free in a particular area, while at other times a season may have much above the average frequency. The latter pattern is more likely to apply to a specific season since favourable conditions for cyclo-genesis can get fixed in a persistent mode. Though two cyclones can follow each other quickly, such as Eric and Nigel, in the Vanuatu/Fiji area within a day or so of each other in January 1985, very close timing tends to be discouraged by the mixing and cooling effect of the first cyclone on sea surface temperatures. The record of cyclone incidence for Fiji (the most cyclone-prone country averaging just over a cyclone per annum) reveals several cases of pairs of cyclones in active seasons not separated from each other by more than 15 days. The prospect of a second disaster quick on the heels of an earlier one must therefore be allowed for in the disaster plan.

One fluctuating process in the atmospheric circulation of the South Pacific is referred to as the Southern Oscillation. This has two behavioural modes, an anti-ENSO and an ENSO pattern (see figure 1, Hastings 1990). In the first mode conditions favour more cyclone development in the western South Pacific over the Coral Sea and adjacent sea areas to the east. In the second mode cyclones tend to be less active west of 165°E and the area of stronger activity is shifted towards the Date Line or further east so that the Cook Islands are more cyclone prone. French Polynesia is not very cyclone-prone but displays this eastern shift. In the marked 1982/83 ENSO phase it experienced five cyclones, a frequency far outside the experience of the rest of this century. Cyclones, therefore, not only display a variety of individual features but quite marked variations in time and location.

There is also the future prospect that the Greenhouse Effect will introduce some departures from present-day patterns of the genesis and behaviour of tropical cyclones. It is too early to predict what these may be, but their possibility must be recognised and there must be a readiness to allow for them in disaster planning. The danger of possible rising sea-levels for low-lying coral atolls, such as those comprising the nations of Kiribati and Tuvalu (see Lewis, 1989), with only two metres or so of elevation above the present high water mark, is accentuated by the combined effect of cyclone surge and waves (even without any increase in cyclone intensity or frequency which some scenarios envisage).

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Figure 1. A. ENSO phases 1965/66, 1972/73, 1976/77, 1982/83 and 1986/87 tropical cyclone tracks in the South Pacific.

### Table 1

**Tropical Cyclone Incidence in the South Pacific 1980-1989**

<table>
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<tr>
<th>SEASON (November to May)</th>
<th>SOLOMONS VANUATU</th>
<th>FIJI</th>
<th>TONGA</th>
<th>COOK IS</th>
<th>NIUE</th>
<th>WALLIS</th>
<th>SAMOA</th>
<th>AMERICAN SAMOA</th>
<th>NEW CALEDONIA</th>
<th>FRENCH POLYNESIA</th>
<th>TUVALU</th>
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<tr>
<td>1980/1</td>
<td>CLIFF(2)</td>
<td>ARTHUR(1)</td>
<td>DAMAN(2)</td>
<td>EMAU(3)</td>
<td>ESAU(3)</td>
<td>CLIFF(2)</td>
<td>FRED(2)</td>
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<td>1981/2</td>
<td>BERNIE(4)</td>
<td>HETIE(2)</td>
<td>ISAAC(3)</td>
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<td>1982/3</td>
<td>JOHN(11)</td>
<td>KINA(11)</td>
<td>LISA(12)</td>
<td>PREMA(2)</td>
<td>TOMASI(3)</td>
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<td>1983/4</td>
<td>ATU(12)</td>
<td>CYRIL(3)</td>
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<tr>
<td>1984/5</td>
<td>HINA(3)</td>
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<td>ERIC(1)</td>
<td>DRENA(1)</td>
<td>FRED(1)</td>
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<td>ODETTE(1)</td>
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<td>NISHA/GRAMA(3)</td>
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<td>WILLIAM(4)</td>
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<td>1985/6</td>
<td>NAHA(5)</td>
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<td>IMA(2)</td>
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<td>JUNE(2)</td>
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<td>1986/7</td>
<td>VELI(2)</td>
<td>OSEA(11)</td>
<td>RAJA(12)</td>
<td>SALLY(1)</td>
<td>ZUMAN(4)</td>
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<td>YALI(3)</td>
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<td>1987/8</td>
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<td>LILY(4)</td>
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**Notes:**
- Tropical depressions which can cause damage, especially flooding, are not included. Underlining shows cases where significant damage is reported.
- Some other cyclones may have caused localized damage. Some may not have passed over the main islands though shown as affecting named island groups. The number in brackets shows month of the season. In February 1990, cyclone "UFA" caused severe damage in W Samoa and American Samoa, Tokelau, Tuvalu, the northern islands of Tonga and Niue.
This danger serves to reinforce the viewpoint being advanced here, that, in addition to the establishment of a general program of disaster management, there is a further need in the Southwest Pacific region to direct attention to the specific and unique features of the cyclone hazard. In other parts of the world a similar conclusion may be appropriate but for a different hazard agent, which may display its own specific and unique disaster generating capacity.

Conclusion: the framework for future disaster planning

In the context of the Southwest Pacific the cyclone threat surely must dominate disaster planning because of its potential to affect frequently extensive areas and cause far-reaching disturbance of the natural environment and virtually all facets of human welfare and activities. Southern (1989, p.4) has no qualifications: 'The arguments for increasing emphasis on the tropical cyclone hazard in development and mitigation planning are inescapable.' It is to be hoped that the International Decade for Natural Disaster Reduction which began this year, will provide a favourable mental environment for the achievement of substantial progress in mitigating the threat from the tropical cyclone.

References

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Southern Oscillation influences on Tropical Cyclone Activity in the Australian Southwest Pacific Region, Journal of Climatology, 10 (In press).


Reducing the Toll of Natural Hazards, UNDRO NEWS January/February, pp. 12-13, 26-27.

A Personal Perspective on Improving Response to Tropical Cyclone Warnings in the Context of Training Programmes for Disaster Managers, ACDRO Newsletter, 7(2), pp. 3-6.

UNDRO. 1986. 
Islands look to disaster plans, UNRO NEWS, July/August, pp. 15, 25.

Professor John Oliver was head of the Department of Geography and the Deputy Chair of the Centre for Disaster Studies, James Cook University of North Queensland, Townsville. He is now a Visiting Professor at the Department of Geographical Sciences, University of Queensland, Brisbane.

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THE INTERNATIONAL DECADE FOR NATURAL DISASTER REDUCTION

THE DECADE AND AUSTRALIA

John Handmer

At its 42nd session, the General Assembly of the United Nations designated the 1990s as the International Decade for Natural Disaster Reduction. The Resolution adopting the Decade was proposed by Japan and Morocco and co-sponsored by 93 UN member nations. Australia was not one of these co-sponsors, but supported the resolution in the General Assembly debate.

Resolution 42/169 has the general objective:

'to reduce through concerted international actions, especially in developing countries, loss of life, property damage and economic disruption caused by natural disasters such as earthquakes, windstorms (cyclones, hurricanes, tornadoes, typhoons), tsunamis, floods, landslides, volcanic eruptions, wildfires and other calamities of natural origin such as grasshopper and locust infestations'.

The declaration of the decade is the result of activity by the US National Academy of Sciences, among others. In 1987 the Academy produced a report Confronting natural disasters which articulated the case for the decade. The US report and the initial thrust of the Decade appeared to be preoccupied with high-technology fixes: for example, satellite-based severe weather warnings, earthquake prediction programs, modern seismic design and slope-stabilising works.

This emphasis has led to criticism and some allegations that instead of the promise of reducing disaster for the developing world, the decade might simply provide a research bonanza for the scientists of the industrialised countries.

However, each member state of the UN is to implement the Decade as it feels is appropriate, and if it believes it appropriate. Australia's participation was announced by the Prime Minister, Robert Hawke, on 21 April 1989. In an earlier letter the Prime Minister indicated

that Australia's most useful contribution would be to concentrate on helping our neighbours in the South West Pacific improve their disaster preparedness capabilities. Disasters in these countries, although small in scale when compared with many overseas events, inevitably affect a high proportion of the population within the affected country. As their economies are also often fragile, the consequences are usually long lasting and can seriously hamper or even reverse development programs (22 Dec 1988).

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The Prime Minister also announced the formation of an Australian Coordinating Committee for the IDNDR, to be chaired by the Director-General of the Natural Disasters Organisation (NDO). The NDO is a small federal agency within the Department of Defence. It coordinates federal government assistance during disasters and runs the Australian Counter Disaster College. The Australian Decade Committee consists primarily of representatives from various government departments and agencies. There are also representatives from research and NGO aid groups: one academic, a member of CSIRO (Commonwealth Scientific and Industrial Research Organisation), and representatives from the Red Cross and from AODRO (Australian Overseas Disaster Response Organisation).

Australia's involvement in the Decade was officially launched by David Simmons, Minister for Defence Science and Personnel at a meeting at the Australian Counter Disaster College, 11-13 February. Other presentations at the meeting dealt with the role of the Coordinating Committee, the UN Committee, the Bureau of Meteorology, intergovernmental action on climatic change and the role of research. Despite the occurrence of the Newcastle earthquake and severe flooding just prior to the launch, the event received disappointing little media coverage.

John Handmer presented a paper on 'The role of research in the International Decade for Natural Disaster Reduction' at the launch in which he questioned the assumption that high-technology had a dominant role to play in achieving the main goal of the Decade: 'to improve the capacity of each country to mitigate the effects of natural disasters expeditiously and effectively.' Disasters result from the interaction of the physical environment with humanity. The vulnerability of the impacted community and its ability to cope are no less important than the magnitude of the physical event in determining whether a disaster occurs. Populations which are marginalised by poverty or displacement by war are likely to have very little coping capacity. As disaster losses include both tangible and intangible damage, the ability to cope should not be seen merely in terms of physical resources, but also in terms of spiritual and emotional resources. For many of these particularly vulnerable groups, the slightest perturbation of the physical environment may precipitate a disaster. Advocating the universal application of the latest knowledge in building design is a typical but futile response: most of the world's population lives far outside the reach of any design codes. Research is most likely to contribute to improvements to this situation, and to the objectives of the Decade, if it concentrates on the political and social causes of disaster.

Dr John Handmer is a Research Fellow at the Centre for Resource and Environmental Studies, Australian National University, and is a Panel Member.
IDNDR AND THE SOUTH PACIFIC - APPROPRIATE AND COORDINATED
ASSISTANCE TO REDUCE DISASTERS

Barry Blake

With the launching of Australia’s participation in the UN-designated International Decade for Natural Disaster Reduction (IDNDR), it is time for Australia in particular, but also for other countries with interests in the South Pacific region, to examine the desirable direction of our IDNDR activities.

The general thrust of Australia’s participation was made clear when the Australian Prime Minister directed the setting-up of an Australian IDNDR Coordination Committee and gave it the following policy guideline:

"The Government’s general approach however is that Australia’s most useful contribution would be to concentrate on helping our neighbours in the Southwest Pacific improve their disaster preparedness capabilities ..."

Having determined that Australia’s contribution to the IDNDR would concentrate on providing assistance to our Southwest Pacific neighbours, the questions that come to mind are: how can we make that assistance appropriate to the needs of these countries and how do we achieve a coordinated input from all concerned?

These questions spring from experience and recognise the fact that many countries and international agencies, both private and intergovernmental, have programs and interests in the South Pacific.

Let us look firstly at the question of appropriateness.

It is necessary to appreciate, at the start, the immense diversity of the South Pacific: the range of island cultures that have grown out of three distinct ethnic groupings (Micronesian, Melanesian and Polynesian); the range of geography which contrasts between high volcanic islands and low coral atolls; the range of languages/dialects (approximately one thousand); the range of socio-political structures (a feudal kingdom to multi-party parliamentary democracies); and the range of climates that vary from equatorial doldrums through monsoonal tropics to frosty mountain highlands. Common to all the island countries are the vastness of distance between island groups; the relatively small populations; the lack of viable, self-sustaining economies and the all-pervasive oceans with their uncertainties of food and sometimes hidden terrors. Some of the world’s ‘least-developed’ countries laze quietly in the Pacific while other infant democracies struggle valiantly to establish their sovereign independence and national identity.

It would be easy for Australia to look at the Pacific from its vantage point as a developed country with well-established and comprehensive counter-disaster systems in place and to start transferring plans, systems and technologies that we believed would reduce the impact effects of the multitude of disaster

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agents that are prevalent in the Pacific. "Appropriateness of assistance" is a fundamental principle a good aid though, which requires us to recognise (i) the individuality of each island country as regards what they perceive to the serious disaster threats, (ii) the adequacy of traditional coping mechanisms and (iii) their desire for outside assistance.

Many natural hazards ravage the Southwest Pacific from time to time, including earthquakes, tsunami, volcanic eruptions, landslips, tropical cyclones, storm surges, flooding, frosts, drought, various infestations and epidemics. All of these have impacted on Pacific island communities this century. Of these agents of disaster, the tropical cyclone is currently the most prevalent and the most damaging to life, property and social order.

While clearly, tropical cyclone impacts deserve the attention of mitigation strategists, we must be careful to take account of the local perceptions of impact effects. Villages might lose their traditionally built houses during a cyclone; but this may not be as important to them as the destruction of their village church. Communities might lose their acreage of cocoa and other cash crops; but this may not be as devastating to them as the loss of their breadfruit, bananas, taro and other garden vegetables. Roads and communications might be destroyed; but this might not be as important to them as the loss of fishing boats and nets. If we are to be truly helpful, our assistance must be appropriate and we must discuss and understand their perceived vulnerabilities and priorities.

It could well be that the most useful assistance with disaster reduction in the Pacific could revolve around providing (i) food security, (ii) some income security and (iii) the protection of essential infrastructure. However, the appropriateness of such assistance and its detail cannot be determined in isolation from the target community. It would be pure coincidence if the priority needs of a community under threat coincided with the preferred direction of academic research, development aid and venture capital from donor countries. For this reason, much "bridge building" is required so as to develop an understanding of the needs and priorities of Pacific countries and to reach agreement with them about the appropriateness of any disaster mitigation assistance offered.

The second essential element in disaster reduction assistance to the Pacific islands is that it must be coordinated. There are few government ministers and counter-disaster officials in island countries to properly deal with a plethora of overlapping and uncoordinated offers of disaster prevention or preparedness assistance. These come from, among other places US Aid, World Council of Churches, various UN agencies, Japan, Australia and New Zealand.

Australia, both governmentally and non-governmentally, has disaster response and preparedness assistance programs in place for the South Pacific. These programs cannot provide all that Pacific island countries require and so there is a need for other assistance of all types. Discussion among authorities in Australia and New Zealand, who are the resident donor countries in the Southwest Pacific, as well as with individual countries,

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regional bodies and other donors, is essential. It would allow coordination and would enhance the effectiveness of IDNDR programs in the South Pacific region.

Barry Blake is Executive Director of the Australian Overseas Disaster Response Organisation (AODRO), Sydney. AODRO is an umbrella NGO which attempts to coordinate the disaster assistance activities of some 20 Australian based NGOs.

INFORMATION FROM MEMBERS

DISASTER RESEARCH AND COMPUTER NETWORKS

David Butler

The last International Hazards Panel Newsletter (#5) contains a piece on page 22 from the Disaster Research Center at the University of Delaware about the Disaster Research (DR) electronic newsletter/bulletin board. Unfortunately, by the time the article appeared, it was out of date. The Natural Hazards Information Center assumed responsibility for Disaster Research last November.

The information on the form and content of DR in Hazards Panel Newsletter #5 is basically correct. However, we have expanded the purview of Disaster Research - it is no longer just for sociologists and other scholars (although they form the core of subscribers); it is also a means of connecting researchers and practitioners (emergency managers) in the field. In addition, the network has expanded from the 45 members listed in the article to well over 100 immediate recipients. I say "immediate" because, as mentioned below, DR is now distributed by other means besides BITNET/Internet, and it is now impossible to determine exactly where it goes and how many persons receive it.

To reiterate the availability information: the newsletter/bulletin board is available via the U.S. academic computer network BITNET, and the larger NSF (National Science Foundation) sponsored supernetwork, Internet (and thus via any network part of or linked to Internet, including the Euroepean Academic Research Network [EARN] and the Canadian network [NETNORTH]). Persons wishing to receive the newsletter should send a note to me (at any of the addresses below) indicating their BITNET/Internet address. I will then add them to the newsletter mailing list. Questions or messages to be posted in the newsletter/bulletin board should also be sent to the addresses below.

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As I mentioned, there are now several other ways of obtaining the newsletter. It is posted via the network known as "USENET," where it is distributed to the "sci.misc" group on that network. Internet access is also available through the commercial dial-up service CompuServe; people using that service can send things to and receive DR via Internet.

At this time, we do not have a "dial-up" facility; however, I have just worked out arrangements to have DR redistributed through two such systems that already exist - the EPIX disaster network at Simon Fraser University in British Columbia (604-291-4921) and the SALEM DUG (State and Local Emergency Management Data Users Group) bulletin board maintained by the Federal Emergency Management Agency in Washington, D.C. (202-646-2887). Persons without access to a mainframe computer on BITNET/Internet can thus still receive DR if they have a computer with a modem and communications software. They need only call (via computer modem) either system (both operate at 8 data bits, 1 stop bit, no parity). There is no charge for using either system; however, users must pay for the long distance call. Several recent issues of DR are already available on both systems.

Note that Disaster Research is more than a newsletter. It is a forum for researchers and practitioners alike to communicate and discuss issues regarding hazards. It is intended to be open and informal. Virtually all views and remarks are welcome, and (to me at least) few, if any, questions are too ridiculous to be posted to the group.

Again, interested persons should send their BITNET/Internet address or direct further questions to me at the addresses below.

David Butler manages the computer based information newsletter/bulletin board at the Natural Hazards Information Center. He is also editor of the Natural Hazards Observer and a Panel member. His address is:

Natural Hazards Research and Applications Information Center
Campus Box 482
University of Colorado
Boulder, CO 80339-0482
Phone: (303) 492-6818
BITNET: Hazards@colorado
Internet: Hazards@vaxf.colorado.edu

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The conference was organized jointly by the Ontario Ministry of Natural Resources, Environment Canada and the Association of Conservation Authorities of Ontario. The attendance was close to 400 and 69 papers were published as conference preprints. The papers were divided into the following themes:

- Land Use Policy and River Basin Management;
- Hydrotechnical Studies;
- Surveys, Mapping and Public Information;
- Shoreline Management

The emphasis was upon Canadian studies but additional presentations were given for the USA, UK, Australia and Jamaica.

Floodplain management in Ontario became a serious issue after the disastrous floods of Hurricane Hazel in 1954. The key to floodplain policy was the adoption of the regulatory flood. The minimum accepted standard is the 100 year event or the limits of the inundation from either Hurricane Hazel or the Timmins Storm. Planning can be 'one zone' or 'two zone'. The former applies to the limit of the 100 year flood while two zone planning recognises a flood fringe between the 100 year and the larger regulatory flood. There is the possibility, normally limited to compatible commercial/industrial development, of Special Area Designation. In such cases the buildings are not for habitation, must be floodproofed and have road access even at time of maximum flood.

The proceedings provided an excellent array of papers that present detailed accounts of policy, legislation and planning procedures that accompany the controls. The coverage of hydrotechnical matters is also of value to non-Canadian readers, especially those who are faced with flooding that results from a combination of both rain and snowmelt. It may be a surprise to low latitude readers to learn that major floods in Ontario are commonly associated with rogue tropical storms. Since 1900 there have been 25 occasions when such events have posed a major threat to Ontario.

The Flood Damage Reduction Program (a federal/provincial initiative) commenced in Ontario in 1978. The Program emphasises the production and use of high quality flood maps. Eighty public information maps have been published in Ontario. Flood mapping, province-wide floodplain management policy and an excellent network of river gauging stations (linked by telemetry) are the key features. Future needs, it seemed to the reviewer, would be improvements in the dissemination of warnings to the public and schemes to encourage damage reduction by the community at risk, for both the residential and commercial sectors.

Several papers deal with the problems of flood risk on the shores of the Great Lakes. The emphasis here is to develop Geographical Information Systems as a data source in order to assist integrated planning and as a guide for policy formulation.

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Such methods are likely to increase in significance as planning tools to counter the risks of possible greenhouse induced sea level rise.

The proceedings have relevance well beyond the Canadian context and the organizers are to be congratulated in providing such an excellent set of papers ahead of the Conference itself. All those concerned with urban floodplain management should find the proceedings valuable. Enquiries regarding price and availability should be sent to:

Canada/Ontario Flood Damage Reduction Program
Ministry of Natural Resources
Whitney Block (Rm 5620),
99 Wellesley St West
TORONTO, Ontario, M7A 1W3
CANADA

D.I. (Dingle) Smith is a Senior Fellow at the Centre for Resource and Environmental Studies, Australian National University.

EVENTS

The Survival Seminars

The Tavistock Clinic runs a series of "survival seminars". A seminar in May by Professor Tars Weisaeth, Psychiatry, University of Oslo, dealt with research strategies and clinical findings from work on disaster survivors. In the September seminar Dr Bessel Van der Kolk will discuss the use of groups as a treatment modality for survivors. For further information contact the Tavistock Clinic, Training Office, 120 Belsize Lane, London, NW3 5BA.

Research Committee on Disasters

The Research Committee on Disasters organised a substantial program as part of the 12th World Congress of Sociology in Madrid, July 9-13. Sessions covered "Cross National Approaches to Disaster: Research and Planning", "Comparative Evolution of National Disaster Planing", "Mass Media in Disaster", "Politics of Disaster Response in Asia", "Research on Risk", "Disaster Impact and Reconstruction", "Risk and Risk Management", and "Post Chernobyl studies". For further information contact the Disaster Research Centre, University of Delaware, Newark, DE 19716, USA.

Disasters and the Small Dwelling: defining the agenda for the IDNDR

This conference is being organised by the Disaster Management Centre, Oxford Polytechnic, September 2-6, 1990. The conference is wide ranging based on three themes: the political, economic and developmental context, the technological and building materials context, and the social, behavioural and cultural

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context. Recent case studies will also be examined, and attention is to be given to the cross cutting issues of: risk assessment and mitigation, emergency planning, training and education, and defining roles and responsibilities. Further information is available from the Centre at Headington, Oxford OX3 OBP.

World Congress on Natural Hazard Reduction

New Delhi, February 1-5, 1991. Further information from The Secretary and Director General, The Institution of Engineers (India), 8 Gokhale Road, Calcutta 700020, India.

Hazards '91


Contextualising disasters

An interdisciplinary conference, February 18-20, 1991, University of Sydney. Organised by the Association for the study of Society and Culture, University of Sydney, and the Disaster Management Studies Centre, Cumberland College of Health Science, Sydney. Further information from "Contextualising disasters", University Union, Box 143, University of Sydney, NSW 2006.
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