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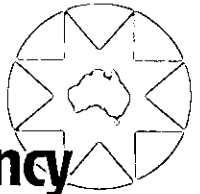
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The journal endeavours to provide an information sharing forum for all those involved in emergency management. Contributions relating to Australian and international emergency activities, articles identifying and discussing issues, policies, planning or procedural concerns, research reports and any other information relevant to the emergency and disaster management community are welcome.

The aim of this publication is the exchange of information and views across the Australian emergency management community, therefore, the views expressed in this journal should not be taken to be the views of Emergency Management Australia.

This journal incorporates a review process. Three levels of review—refereeing, editorial board review and editing—are conducted. Material submitted for publication should be on disk and reach the Editor by the following dates: Summer—September 15th; Autumn—December 15th; Winter—March 15th; Spring—June 15th. The editorial committee reserves the right to determine the suitability of all material submitted and where necessary to edit submissions.

Articles for publication may be forwarded to:

Rob Fleming
 Editor
 Australian Emergency Management Institute
 Main Road
 Mt Macedon, Victoria 3441
 Tel: 03 5421 5100; Fax: 03 5421 5272
 Email: rfleming@ema.gov.au

Subscriptions

If you wish to be placed on our mailing list please contact Rob Fleming, Australian Emergency Management Institute, at the above address.

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 RSD 813 Spring Hill, Victoria 3444
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Education and young people – forces for change?

The United Nations 2000 World Disaster Reduction Campaign has as its theme, 'disaster reduction, education and youth'. Its aim is to continue building a culture of prevention through education channels so that the youth of today can play an active role in reducing the impact of disasters in the future. Indeed the campaign states that, 'A culture of prevention is something that forms over time. What is needed is a change in our attitude, based on the conviction that we do not need to be fatalistic about disaster risks and a willingness to act upon that conviction. This mind-set is best developed at an early age.'

Consequently schools, particularly students, present as an important ingredient in developing a culture of prevention. Young people learn easily and care about making the world a safer place. Encouraging their direct participation will also help them develop a greater sense of their own responsibilities. It is envisaged that the development of a national approach to emergency management school education will encourage the vision of a safer community.

During the International Decade for Natural Disaster Reduction (IDNDR) 1990–1999, the Australian IDNDR Coordination Committee developed a strategy to support school education and disaster reduction. The aim was to include information in school curricula on prevention strategies for, and the effects of natural hazards on, communities. This strategy aimed to raise the level of community awareness and education regarding natural hazard risk and disaster prevention and preparedness through the school system. The challenge was to shift the emphasis from a concentration on natural hazards and their potentially disastrous effects on communities, towards exploring risk awareness and management options for vulnerability reduction.

The approach targeted teachers and subject associations using the development of quality curriculum-based disaster education resources expected to

maximise the teaching of this topic in classrooms. Key to its success was the strong influence of teacher advocates and the targeting of school children which sought to encourage long-term change in attitude and behaviour regarding natural hazards. Over time this could be expected to permeate to the adult community.

December 1999 marked the end of the International Decade for Natural Disaster Reduction and the full time secretariat within Emergency Management Australia. The decade has seen significant progress in the approach to emergency management school education. Nevertheless, there needs to be a concerted effort to ensure the impetus generated is maintained. How might this be achieved?

In June 2000, a school education workshop was held at the Australian Emergency Management Institute (AEMI), Mt Macedon, Victoria where representatives from emergency management and school education agencies gathered together in a cooperative effort to develop an appropriate policy and strategy. One of the proposed outcomes was to develop an agreement between the states and territories in framing a uniform approach to school education that would support the National Emergency Management Committee's vision of 'a safer community'. In his keynote address Associate Professor John Lidstone, Queensland University of Technology, noted that the agendas of school curriculum and emergency management needed to overlap in order to achieve its public safety goal.

The workshop identified four clear policy objectives in support of a nationally coordinated approach:

- to develop and maintain a coordinated approach to enhancing community safety and emergency management through school education;
- to facilitate on-going working partnerships between the emergency management and school education communities
- to support current school curricula in such a way as to encourage understanding and application of Australia's

agreed approach to community safety and Emergency Management

- to support and complement current State and Territory school education initiatives in community safety and Emergency Management.

These objectives incorporate the strategy of the international decade but acknowledge the need for cooperation and goodwill across governments, communities and organisations. The promotion of partnerships and mutual obligation is central to achieving the vision of 'a safer community'.

Similar sentiments are expressed in the foreword to the *National Emergency Management Strategic Plan 2000–2005* where it is noted that those involved at the Commonwealth, State and regional levels in emergency management in Australia need to adopt and implement arrangements aimed at reducing the vulnerability of our communities through proactive rather than reactive means. Schools not only can be used to disseminate knowledge but also can be an interface between those who seek to reduce the impact of disasters and the less accessible groups at risk within a community such as family groups.

While there is a continuing need to reiterate the important emergency management messages and develop and market quality teaching materials a nationally coordinated approach with clear objectives is necessary to ensure such an 'interface' is nurtured. Recent endorsement of this national approach by the National Emergency Management Executive Group and an ongoing resourcing commitment by Emergency Management Australia to support this priority are catalysts for action. The workshop 'Implementing Emergency Management School Education' to be held at AEMI in early October will see the consolidation of the arrangements required to support a nationally coordinated approach.

*John Fitzgerald
School Education Officer
Emergency Management Australia*

Technical expertise as a contributing factor in three disasters

Serious questions about the way some engineering activities were managed have arisen from coronial inquiries and government investigations into three major fatal accidents — the Royal Canberra Hospital implosion, the fire on the HMAS Westralia, and the gas explosion at Esso's Longford facility. Analysing the reports reveals that a lack of technical expertise, a failure to assess the competencies of contractors, and inadequate engineering practice were contributing factors in each of these accidents.

While this paper has an engineering and contracting focus, this does not mean that these were the only or even the most critical factors contributing to the disasters. As with most accidents, the failure cannot be attributed to one individual or group. Instead the system failed and the failures involved many players and factors.

However this does not diminish the importance of the lessons drawn from this analysis. Every group of specialists should analyse the causes of the disasters from their perspective and publicise their findings. This way individuals working in any area can identify the lessons that have the most relevance for them.

What went wrong

A brief summary of each disaster is provided below.

Royal Canberra Hospital implosion

On 13 July 1997, the Royal Canberra Hospital was demolished by a planned implosion. A 1kg fragment of steel expelled during the implosion killed a spectator who was 430 metres away from the hospital among a watching crowd of over 30,000. The project director was the government-owned enterprise Totalcare (TCL), the project manager/contract superintendent was Project Coordination (PCAPL), the demolition contractor was City & Country Demolitions (CCD), and the explosives sub-contractor was Controlled Blasting Services (CBS). The CBS explosives sub-contractor and shot-firer, Rodney McCracken, was committed for trial for manslaughter by gross negligence in December 1999, and the CCD demolition contractor, Tony Fenwick, was committed for trial in February 2000 for

by Athol Yates, Policy Analyst at the Institution of Engineers, Australia

being knowingly concerned in the commission of that offence by Rodney McCracken.

HMAS Westralia ship fire

A fire occurred in the main machinery space of HMAS Westralia on 5 May 1998, which resulted in the death of four personnel. The fire was caused by diesel fuel from a burst flexible hose spraying onto a hot engine component and then igniting. The hose was one of a number of new flexible hoses supplied by the ship's support contractor, ADI Limited, to replace the original rigid pipes (Department of Defence, p. 216).

Esso Longford explosion

On 25 September 1998 at 12:26pm, a heat exchanger in Longford's Gas Plant 1 fractured, releasing hydrocarbon gases and liquid. The resulting explosions and fire killed 2 Esso employees and injured 8 others. The heat exchanger failed when hot lean oil at 230°C was reintroduced to the chilled vessel, which had fallen to -48°C. The introduced lean oil set up stress and caused a brittle failure. Full gas supply to customers was not restored until 14 October 1998 (Parliament of Victoria, pp. 11-12).

Lack of technical expertise

In all three accidents, a lack of technical expertise was identified as contributing to the tragedies. The expertise was either lacking in the contract managers and contractors, or unavailable when required.

RCH Implosion

In the hospital implosion, the ACT Coroner found that the officers appointed by the government-owned project director, Totalcare (TCL), to manage the contractor were asked 'to undertake a function well beyond their experience, qualifications and skills' (ACT Coroner 1999B, p. 41). Specifically, the Coroner found that the representative of TCL '...was nominated as a supposed expert and was under significant pressure from certain Government officials to provide

advice particularly as to the viability of the implosion being staged as a public event' (ACT Coroner 1999A, p. 655) however he did not '...have the requisite technical experience to be providing sound and reliable advice' (ACT Coroner 1999A, p. 655). This was despite the Coroner's view that '...TCL had the technical expertise or at least were in a position to acquire that degree of expertise for the project' (ACT Coroner 1999A, p.393).

The lack of expertise is vividly illustrated in the risk assessment document prepared by the Project Manager in consultation with TCL staff. The Coroner said that: 'None of those persons possessed any knowledge or experience in the implosion technique and [they] were unqualified to prepare a true risk assessment of the demolition. The so-called risk assessment plan was a failure. The plan did not address the issues that were required by such a scheme, e.g. the specific methodology to be used, the experience of the contractor in undertaking similar implosions of similar buildings and finally, the protective methods intended to be used. The risk assessment plan assumed that the implosion would be safely conducted because other implosions had been safely conducted' (ACT Coroner 1999A, p. 268).

HMAS Westralia fire

In analysing the decision to replace the rigid fuel pipes with flexible hoses on HMAS Westralia, the Naval Board of Inquiry found that there was no competent authority either within the Royal Australian Navy or the Project Manager, ADI, which 'critically examined the wisdom of the intended course of action' (Department of Defence, p. 197).

It concluded that: 'Key personnel within the RAN, and more particularly ADI Limited, were not adequately trained or qualified for the responsibilities placed on them' (Department of Defence, p. 216). For example, the Westralia officer who was responsible for management of HMAS Westralia's maintenance had not been trained in contract administration and had only completed a 2-3 day financial training course and a basic purchasing course (Department of Defence, p.194).

Longford Explosion

In analysing the Esso Longford explosion, the Royal Commission identified that access to technical expertise was limited and this may have contributed to the explosion. In 1992, Esso relocated all its plant engineers to Melbourne as part of restructuring. The Royal Commission noted that: 'The change appears to have had a lasting impact on operational practices at the Longford plant. The physical isolation of engineers from the plant deprived operations personnel of engineering expertise and knowledge which previously they gained through interaction and involvement with engineers on site. Moreover, the engineers themselves no longer gained an intimate knowledge of plant activities' (Parliament of Victoria, p. 209). The Royal Commission concluded that: 'The reduction in supervision at Longford, including the transfer of engineers to Melbourne, necessarily meant a reduction in the amount and quality of the supervision of operations there. There was a correspondingly greater reliance by Esso on the skill and knowledge of operators. While it is not possible to discern any direct connection between the level of supervision and the accident on 25 September 1998, the Commission considers that it was probably a contributing factor' (Parliament of Victoria, p. 236).

Failure to assess the competencies of contractors

The failure to fully assess the competencies of contractors and sub-contractors was identified in both the hospital implosion and HMAS Westralia fire reports.

During the examination of the hospital implosion, the ACT Coroner strongly criticised the selection process of the contractors and subcontractors. He found that the government-owned Project Director, Totalcare, 'should never have allowed the Project Manager, PCAPL, to proceed beyond the expressions of interest stage without ensuring it had the credentials to assess the quality of tenders, especially in the implosion method' (ACT Coroner 1999A, p. 121). The Coroner reinforced this view when he wrote that the advertisement placed by PCAPL calling for expressions of interest in the hospital demolition 'was not only narrow but poorly worded in so far as it did not contain words that might attract experts in the implosion method' (ACT Coroner 1999A, p. 153) and this 'reflects the poor decision made by TCL in permitting a continuation of PCAPL as the Project Manager into a realm where the company had no experience'. (ACT Coroner 1999A, p. 154).

The Project Manager, PCAPL, was also criticised for its selection process failure. The Coroner stated that '...TCL did not, as a matter of procedure as a Project Director, impose any external checks on the expertise or ability of the proposed successful tenderer, prior to accepting PCAPL's recommendation. ... TCL and PCAPL failed as a matter of procedure and care to vet or require appropriate level of information from those tendering. These failures should never again be allowed to occur' (ACT Coroner 1999A, p. 172). 'There was a failure on the part of everyone present [TCL and PCAPL] to ensure that adequate objective checks of the contractor and explosives expert had been undertaken prior to approval of PCAPL's recommendation of the successful tenderer.' (ACT Coroner 1999A, p. 173).

Another example of the failures was that 'PCAPL and TCL failed to ensure as they had directed that the new engineer had experience in the implosion techniques using explosives. No independent check was made as to who the engineer was and his qualifications' (ACT Coroner 1999A, p.329).

The net result was that the contractors did not have required skills. The ACT Coroner summed this up by stating that: 'There is no escaping the fact that the project did not have the benefit of the relevant expertise in explosives or engineering capabilities' (ACT Coroner 1999A, p. 157).

The Coroner linked the death of the spectator with the selection process for contractors and sub-contractors when he wrote that: 'The process by which those persons were appointed, was connected to that death' (ACT Coroner 1999A, p. 182). 'Although there were varying degrees of responsibility the inescapable conclusion is that these poor work practices of PCAPL and TCL in the appointment process permitted two persons to be assigned to the demolition project who were entirely unqualified for the task' (ACT Coroner 1999A, p. 182).

In analysing the HMAS Westralia fire, the Board of Inquiry concluded that the contractor may have not given the competency of the sub-contractor the appropriate attention. This was because the sub-contractor presented himself as a representative of a franchising hydraulic hose fitting organisation which was known to be a supplier of high performance industrial hoses and held a quality system certification to Australian Standards AS3902 (Department of Defence, p. 182). The representation 'implied a depth of expertise and knowledge which the Sub-

contractor could not, and did not, provide' (Department of Defence, p. 187), according to the inquiry.

Inadequate engineering process

In both the hospital implosion and HMAS Westralia fire, contractors failed to deliver accepted engineering process. This is illustrated in the examples below.

In analysing the HMAS Westralia fire, the Board noted that the decision to replace rigid fuel lines with flexible hoses should have been processed through the Royal Australian Navy's configuration change process as well as being approved by the ship's classification society, Lloyds Register. According to the Board, 'both processes were bypassed, largely as a result of ignorance and incompetence' (Department of Defence, p. 216).

The report noted that 'the formal RAN configuration change process is circumvented at times, generally by well intentioned personnel, and this can have a severe impact on safety' (Department of Defence, p. 198). However 'to be on the safe side, all changes to ships should be subjected to a rigorous change process, but this approach ignores the imperatives of schedule, common sense and initiative' (Department of Defence, p. 197).

It advised that 'the key to the right approach is good professional engineering judgement. Ideally, this would be exercised in the first instance by the initiator of the potential change but a professional engineering authority should validate it before work is set in train.' (Department of Defence, p. 197). As a result of the inquiry, it was recommended that all engineering work should only be authorised by a competent professional engineering authority.

Regarding the hospital implosion, the ACT Demolition Code of Practice required that an independent structural engineer and an explosives demolition expert be engaged on the hospital implosion project. This was ignored which meant that no independent cross checking of the work on the contractor and sub-contractor was carried out.

This failure was also identified by the ACT Coroner as contributing to the disaster. 'The Acton Peninsula project failed systemically in that: ... (e) the project did not have the benefit of a structural engineer and an explosives demolition expert in accordance with the Demolition Code of Practice both independent of the contractor, sub-contractor, project director and manager - that is two experts at arm's length from the total demolition process.' (ACT Coroner 1999B, p. 40).

Lessons learned

From a contracting and engineering perspective, there are five significant lessons to be learned from the disasters.

Lesson 1: be an informed buyer

The disasters have highlighted the need for the buyer to be informed. This is essential so that the buyer is able to select and justify the option which offers best value for money; manage risks; select and justify an innovative solution; and prevent unscrupulous contractors taking advantage of the buyer's lack of knowledge.

Being an informed buyer requires two distinct skill sets: contracting expertise and subject matter expertise. For engineering goods and services, the subject matter knowledge required is engineering technical expertise. Access to technical expertise is becoming more critical with the general reduction in technical staff within organisations, and the devolution of power to individual plants and individual staff. In addition, with the increase in the size of contracts due to cluster contracting and the increasing technological complexity of operations, there is a corresponding increase in the financial loss that can result from uninformed decisions.

For engineering contracts, different types and depths of technical expertise are required for each stage of the contracting process. For example in the first stage of a contract, which involves identifying the activity to be contracted, technical expertise is essential to rigorously identify the desired functional levels, performance levels and constraints; identify the full range of probable technical solutions; and advise on the risk, cost and functional/performance tradeoff of all options. When the project moves to developing the tender documents, technical expertise is necessary to develop appropriate criteria so that a trade-off can be made between the functionality, performance, risk and cost of each proposal.

The need for technical expertise does not necessitate that an engineer is the contract manager. The view that engineers must manage technical contracts as they are the only ones to understand technical issues does not address the fundamental issue. Nor does the counter argument that engineers who manage technical contracts always strive for gold-plated solutions. The discussion needs to move past these stereotypes to recognise that both contracting skills and technical skills must be brought to bear in all contracts and this is the only way to maximise value for money.

Similarly the debate on where it is best for organisations to obtain technical expertise—either in-house or to contract it in—is not productive.

Making technical expertise readily available in the most cost-effective manner involves four stages:

- examine the good or service to be procured to determine the level of technical expertise required to be an informed buyer
- evaluate the relevant existing level of in-house and external technical expertise available
- undertake a cost benefit analysis of in-house versus contracted-in expertise at each stage of the contracting process
- obtain and where appropriate, retain the required expertise

The critical issue is that the client must have access to technical expertise when it is required and that they realise when they do not have the necessary expertise and should contract it in.

Lesson 2: ensure technical advice is utilised

It is obvious that technical expertise is of no benefit unless it is used. There are a number of reasons why engineering expertise may not be sought or utilised and these include that the advice will not be understood, that the advice will advocate a 'gold-plated' technical solution which ignores commercial realities, and that the organisation's structure will prevent expertise from being accessed by other parts of the organisation.

An example of the last reason was identified in the Federal Government inquiry into the unsatisfactory Collins-class \$4.3 billion submarine project. 'The technical competencies required for the project are generally available, but in certain areas, have been made unavailable by the structure of the contract or the interests of the parties...' (McIntosh, p. 8).

Lesson 3: undertake comprehensive competency assessment of contractors

The reports into the disasters identified the need to ensure that only competent contractors and sub-contractors are selected. The ACT Coroner recommended that to minimise the risks to public safety in future public works projects '...any claims made by the tendering body as to their ability to meet any special requirements must be independently and objectively checked before the letting of the contract'. (ACT Coroner 1999A, p. 495-6). The Federal Government report into the Collins class submarine project stated that one of the lessons learned was the need to validate the technical expertise of contrac-

tors. 'Defence should ensure that the prime contractor and the subcontractors have the technical, financial and managerial expertise to carry out the project and to respond to likely risks' (McIntosh, p. 38).

There appear to be several reasons why competencies are not checked or inappropriate contractors are chosen. These include a lack of time, a lack of effort, inappropriate selection criteria and choosing contractors on price alone.

In the case of the hospital implosion contract, a lack of time for contractors to assemble the information required to make an informed tender bid was clearly identified. According to the Coronial report: 'The tenders for Stage 1 of the project opened on 3rd March 1997 and closed on 18th March 1997. It was not until 13th March 1997 that the structural drawings provided to those on the short list were made available by way of addendum to the tender documents...It will be recalled that Canberra Day was a Public holiday and fell on Monday 17th March 1997. Effectively this meant that the tenderers had only one working day after the probable receipt of the structural drawings, to inspect the site in any depth as to the steel mentioned in the columns and then to price their tender to take account of the size and quantity of steel in the columns in Stage 1. In the circumstances this was clearly an inadequate amount of time.' (ACT Coroner 1999A, p. 163-4).

Selecting contractors on the basis of lowest price is a major problem for government contracts and probably private sector contracts also, as identified in a survey undertaken by the IEAust in January 2000 (IEAust, p. 3).

According to public servants involved in engineering contracts, 10% of contracts worth a net value of \$7 billion were awarded on the basis of lowest upfront cost.

Industry tendering to government believed it was actually 4 times higher at 33%. There are a number of methodologies designed to ensure that the prime selection criteria is overall value for money rather than lowest cost. These include Value Management, Qualification Based Selection, pre-qualification schemes and registration schemes. Value Management does this by providing a flexible process for contract delivery that allows and encourages contract changes to be made easily and as early as possible, if they can improve the contract's value for money. Qualification Based Selection (QBS) does this by determining the price only late in contract negotiations. Pre-

qualification schemes do this by limiting the potential contractors to those who meet range of agency-determined attributes. Registration schemes do this by ensuring that potential contractors are competent and ethical.

Lesson 4: follow proper engineering process

The disasters illustrated the consequences of not following proven engineering, contracting and safety processes. These processes, such as risk management or OH&S regulations, were invariably developed after years of experience and thoughtful improvement. Bypassing these proven processes or rationalising them by eliminating cross-checking and supervision to save time and money can have exactly the opposite effect. The consequences of failing to follow established safety procedures are seen in both the hospital implosion and Esso Longford explosion.

In the hospital implosion, ACT WorkCover did not follow established safety processes when it failed to ensure that the explosive workplan required by the Demolition Code of Practice was met, and that it failed to scrutinise departures from the original demolition workplans and to issue appropriate prohibition notices in accordance with the OH&S Act to ensure the methodology was safe not only to the workplace employees but also to the public at large (ACT Coroner 1999A, pp. 273-274). As a result of these findings, a review of WorkCover occurred.

According to Tom Sherman, who was commissioned by the ACT government in December 1999 to assess the ACT Government response to the Coroner's Report, 'WorkCover now has good procedures in place for monitoring the use of explosives in the ACT. Blasting Plans have to be submitted and those plans are vetted by an independent expert. Post-blast reports are also required.

I am reasonably confident that the procedures, skills and culture now in place in WorkCover provide good prospects for effective regulation of the use of explosives' (Sherman, p. 33). However he noted that changes to a system alone are not sufficient to ensure that established processes are followed. 'The best legislation and contracts will be of little use if those responsible for the monitoring compliance with workplans fail to carry out their tasks' (Sherman, p. 343).

In the Esso Longford explosion, there was a failure to carry out a Hazard and Operability Study (HAZOP) which was common practice in the process industry.

'Esso recognised the particular significance of a HAZOP study for Gas Plant 1 (GP1), given the age of the plant, the modifications made to its initial design and the changes to design standards since the plant was built. These reasons grew stronger with the passage of time. Indeed, a HAZOP study for GP1 was planned to take place in 1995 and the cost of such a study was included by Esso in successive budgets during the years 1995 to 1998' (Parliament, p. 203). The Royal Commission identified that the failure to undertake this process was a contributing factor to the disaster. 'The failure to conduct a HAZOP study or to carry out any other adequate procedure for the identification of hazards in GP1 contributed to the occurrence of the explosion and fire.' (Parliament, p. 235).

Lesson 5: contractors may have a broader responsibility than the specific wording of their contracts

The findings on the hospital implosion and HMAS Westralia ship fire have indicated that individuals and contracting organisations may have a broader responsibility than the specific wording of their contract. The inquiries' views on this issue are far from clear cut. They depend very much on individual circumstances and are yet to be tested in court.

In assessing the work of the structural engineer in the hospital implosion, the Coroner concluded that 'it is no excuse to simply make the claim that his role was one of a consultant and not that he was engaged or retained in a supervisory role' (ACT Coroner 1999A, p. 372). One of the recommendations of the Coroner was that this engineer's 'right to practice as a professional engineer be further examined by the appropriate professional body' (ACT Coroner 1999A, p. 374). The IEAust noted that the engineer was neither on the National Professional Engineers Register nor a member of the IEAust. Therefore he is not bound by the IEAust's Code of Ethics nor subject to the IEAust disciplinary processes, which means it is not possible for the IEAust to review his right to practice. This may not be the end of this issue as the Sherman report which assessed the ACT Government's response to the Coroner's Report, released on 14 February 2000, noted that 'I recently discussed this matter [i.e. the engineer's right to practice] with the Director of Public Prosecutions. He advised me that he proposes to refer this matter in the near future' (Sherman, p. 22).

The Sherman report also contained some opinions on the responsibilities of

various parties in cases where the contract is unclear. 'It is evident from a reading of the Coroner's Report that there was much confusion and disagreement on the roles and responsibilities on the Action Peninsula project. The Project Manager in construction/demolition contracts has the responsibility to engage and supervise the work of contractors. Equally, Project Directors and clients cannot completely shed their responsibility. If a Project Manager is not ensuring that contractors are appropriately qualified and skilled and is not ensuring the contractors are doing their work as the contract requires, then Project Directors and clients must bring them to account or at least have expert consultants who are capable of doing so. It is important that contractual provisions set out the roles and responsibilities of the parties clearly. But no contract, however well drafted, guarantees that work will be done properly. Contracts have to be managed and supervised properly. Also I don't believe it is productive to engage in lawyer-driven correspondence on the meaning of contractual provisions. There are circumstances where this may be appropriate but in most cases a more effective result is likely to come from discussion of problems.' (Sherman, pp. 32-33).

In the HMAS Westralia inquiry, the Navy Board noted that while the contractor was not specifically requested to do an engineering analysis in replacing the rigid hoses with flexible ones, the contractor 'had a general obligation as the engineering contractor to make a proper engineering assessment of the proposal taking all factors into account. The standard of that consideration should have accorded with the engineering expertise and 'world class' which ADI claims.' (Department of Defence, p. 179).

Although not a contractual issue, the Code of Ethics for professionals may have a bearing on interpretation of their responsibilities, regardless of the contractual wording. For example, the Tenets of the Code of Ethics for the Institution of Engineers, Australia's include 'members shall at all times place their responsibility for the welfare, health and safety of the community before their responsibility to sectional or private interests' and 'members shall apply their skill and knowledge in the interest of their employer or client for whom they shall act as faithful agents or advisers, without compromising the welfare, health and safety of the community'.

This broad interpretation of what is expected of contractors, despite the

wording of their contracts, means that they need to keep an eye on the overall project as well as undertake their own work. The implications of this include that a defence based on the strict wording of a contract may not always be accepted, contractors should only practice in their area of competence regardless of what the client may want, contractors must document any concerns they have about their work, and contractors must insist that proper engineering processes are followed.

The view that contractors may have a broader responsibility than the specific wording of their contract has profound implications. Resolution on this issue in a general contractual sense will take many years.

Conclusion

This paper has identified a number of common factors from an engineering and contract management perspective in the Royal Canberra Hospital implosion, the fire on the HMAS Westralia, and the gas explosion at Esso's Longford facility.

In addition, these disasters raise a number of broad issues about engineering management not addressed in this paper. These include questioning accepted management wisdom such as the use of non-technical generalists to manage technical activities; reducing the number of specialists on the basis of often arbitrary benchmarking; and solely relying on quality assurance rather than supervision.

Many other non-technical issues have

also been identified as contributing to the disasters including a lack of operator knowledge, failure to undertake systematic hazard identification, and the employment of inadequate incident report systems which focus on high frequency low severity events while ignoring low frequency high severity incidents.

Much more work needs to be done to analyse these disasters from a range of specialist perspectives. While these disasters have been tragic, a far greater tragedy will result if more analysis is not done and we all fail to learn from these failures.

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Author's contact details

Athol Yates
Policy Analyst
The Institution of Engineers, Australia
11 National Circuit
Barton ACT 2600
phone: 02 6270 6555
fax: 02 6273 2257
email: Athol_Yates@eol.ieaust.org.au

A more detailed examination of the issues raised in this article can be found in the publication, 'Government as an informed buyer: Recognising technical expertise as a crucial factor in the success of engineering contracts', published by the IEAust in January 2000, and available from www.ieaust.org.au/government. Athol Yates is currently compiling a database of contracting, policy and regulatory disasters where a lack of specialist advice was a contributing factor. If you have Australian examples of these, please contact him.



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Learning from 'near-misses': a case study

Introduction

According to Professor Brian Toft (1992) one of the ways to build a safer physical environment is to learn and apply the lessons of past disasters. In Britain such 'isomorphic learning' has provided for safer building structures (following the Summerland fire of 1973), for better controls on drugs (following the Thalidomide medical scandal in the 1960s) and for better management of industrial waste (following such acute and chronic disasters as Aberfan in 1966 and the ongoing contamination of the Irish Sea with nuclear waste products). Following the Southall train crash of September 19, 1997 and Paddington rail disaster of October 5, 1999, isomorphic learning may even provide for a safer rail transport system in the United Kingdom after years of lazy government, sloppy management and under-investment in basic safety infrastructure. It should not be forgotten, however, that equally important lessons can be learned from near misses - provided, of course, that they are recorded (a prerequisite being that participants are willing and able to talk about their experiences), analysed and acted upon. This article is based on the premise that we can learn as much (if not more?) from near misses as we can from full-blown disasters.

The case study

The case study is of a near miss crowd disaster in the early 1980's. The data is derived from the personal testimony of a police officer present at the event in question. (This officer has since been promoted to a senior position in the same Police force). Despite the passage of time, and much intervening safety legislation, the event described below is relevant and significant even today. First, because it seems to corroborate the accusation that, at this time in the United Kingdom, the Police (regardless of the County in question) were more concerned with issues of public order than public safety at major gatherings. Secondly, because it demonstrates the potential negative consequences of didactic, uniplex, hierarchical command structures. Thirdly, because it shows how police officers (and, potentially, other officials) can become

by Dr Simon Bennett, Lecturer in Risk Studies, Scarman Centre University of Leicester

so wedded to a strategy that they fail to notice (or choose to ignore?) its disintegration or complete collapse. And fourthly, because it demonstrates the need for effective communication and coordination between the organisers of an event, the Police and attendees.

What is perhaps most interesting from a historical perspective is that some of the potential lessons of the near miss described below appear to have been applied (coincidentally, it must be said) later in the decade by Greater London's Metropolitan Police Service (MPS). Thus in 1988 the MPS embarked on a very successful innovation at the trouble-prone Notting Hill Carnival - that of policing the event with the consent and cooperation of the Carnival's 'steakholders' (the event's organisers, local traders, the London Borough of Kensington and Chelsea, the emergency services, London Underground Limited, musicians, vendors, attendees and other interested parties). The initiative, known to the MPS as 'The Way Forward', achieved a 92% reduction in crime at the Carnival. Its major feature is its 'corporatism' — the inclusion in the event's year-round planning cycle of anyone who might have a contribution to make to assessing the risks and opportunities of Carnival.

Despite the fact that the near miss described below took place some twenty years ago, the persistence of certain dysfunctional organisational behaviours and traits means it is still relevant; Even today, event organisers can fail to communicate effectively with the Police, and vice-versa. Even today, rigid command structures inhibit the multiplexing of valuable intelligence. Even today, Officers may 'construct' behaviour born of fear and/or panic as behaviour born of criminal intent. It can only be hoped that the organisers of today's global sporting events have the imagination to examine and learn from not only the high-profile disasters of the past, but also such near misses as that described below.

Current UK guidelines

According to the British Health and Safety Executive's (HSE's) recent publication *The Event Safety Guide* (HSE: 1999), it is the responsibility of the organisers of an event '... to provide an arena in which the audience can enjoy the entertainment in a safe and comfortable atmosphere' (p.12). To this end careful consideration should be given to entrances and exits, 'the available space for the audience' (p.12), barrier design, stewarding, public address systems and 'holding areas' to minimise the risks of tripping and crush-related injuries. Special attention should be paid 'to the needs of children and those with mobility difficulties' (p.51). Indeed, the Guide goes as far as to say that 'It may not be appropriate to allow young children ... to attend certain events because they may be trampled or crushed' (p.50). This and similar good advice contained in *The Event Safety Guide* deserves the widest possible audience. Certainly, the impacts of such well-known crowd-related disasters as Ibrox Park (in Scotland) and Hillsborough (in England) might have been mitigated had this advice been available at the time.

Learning from near misses

In my view it is not so much the well-publicised disasters of the recent past that make *The Event Safety Guide* and related HSE publications so important, but the - often unpublicised - near misses. Had these near misses developed into full-scale disasters, the loss of life at major public gatherings over the past thirty years would have been much greater. The fact that they did not evolve into full-scale disasters owes much to the efforts of numerous unsung heroes and heroines, many of them junior police officers. To illustrate this point, and to emphasise the importance of the work of the HSE and similar agencies in other countries, I reproduce below an account of a near miss. The account is taken from a narrative produced by one of the junior police officers who was on duty on the day of the event in question. For reasons of confidentiality, neither his name nor the exact location and details of the event can be revealed — the narrator is now a senior officer in the same northern English city that experienced the near miss.

The officer's narrative has received only superficial editing (to clarify certain points). The facts of the event (as recalled by the officer), and the tenor of the officer's narrative, have not been altered. The account is consequently reproduced below in the first person.

The testimony

'It was during the 1980s that the local football team returned from a major triumph at Wembley. The team paraded through the city in an open-top bus, to a civic reception held at the Town Hall. Outside thousands of people waited in the Central Square, to cheer the team as they appeared on the balcony.

In the Square, rigid and substantial barriers had been sunk into the ground. Police officers were situated in front of these barriers. As at Hillsborough, it was the more family-oriented groups who were at the front, pressed against the barriers, so that the young children could see better. The more vociferous and rowdy elements arrived later. Many were intoxicated.

For us this was a public-order operation. Our rules were dictated by our experience of football crowds. Unfortunately, this experience was tainted by a concentration on managing the aggressive and violent minority. Our attitudes towards crowds had been forged in the 1960s and 1970s during efforts to prevent hooliganism. We saw football fans as constituting a homogeneous group. Discretion was rarely used in dealing with crowds, and not encouraged. Public safety was not a major issue in dealing with such events.

As the crowds became larger, the children at the front began to be pressed against the barriers. This caused distress amongst the children and their parents. We patrolled the barriers at a distance. This meant we could not hear the children crying. The crowd was not to be trusted or communicated with. Individually, we blocked our minds to what was occurring. This minimised the anxiety that can be produced when duty and conscience come into conflict. The acknowledgement of distress by those set in a confrontational, enforcement role can generate personal anxiety.

In my view the enforcement role needs to be balanced against a Police Constable's primary duty—the protection of life and property. This primary duty came to the fore during the celebration. Along the line of the barriers, police officers, on their own initiative, began to communicate with the parents. They then began lifting the smaller children out of the crowd,

placing them in front of the barrier at their parents' feet.

Initially, the Sergeants, who were nearby, directed against the action taken. However, they quickly recognised the need to remove the children. The Police Inspector, who was further away from the crowd, issued similar commands until being persuaded by his Sergeants that the action was correct. However, the Police Superintendent (who had drafted the Operational Order), standing further away from the crowd, saw the action only as a disregard of his directions. The Superintendent approached the Constables, and ordered that the children be returned over the barrier. Our concerns [as Constables] were disregarded. The children were placed back over the barrier, causing great distress to the families. It should be noted

'... In my view the enforcement role needs to be balanced against a Police Constable's primary duty—the protection of life and property.'

that there was nowhere else for the families to go. The weight of the crowd was so great that they could not have retreated back through the crowd, and evacuating a family from the area by bringing them over the barrier would not have been considered. The barriers in the Square performed the same function as the crowd barriers that might be found in a stadium.

The level of distress amongst the children became so great that, once the Superintendent had left, the Constables lifted them back over the barrier. This unauthorised action brought the Superintendent back again. (Why he chose not to follow the chain of command, and issue his orders through the Inspector and Sergeants, is a matter for speculation). On this occasion, he put the children back into the crowd himself. On voicing their concerns for the safety of the children, the Constables were told; 'It is against the [Operational] Order'. When it was suggested that the Operational Order could result in a fatality, the Superintendent replied; 'It is not your responsibility'. I find

it difficult to be certain exactly what that remark meant. Perhaps the Superintendent was suggesting that Constables, in general, should not assume responsibility or use discretion, but should rather obey orders without question? Or, alternatively, was the Superintendent implying that the welfare of the children was not the concern of the Police? Whatever the answer, it is not my purpose to lay the blame solely at the feet of the Superintendent. All the Officers involved had commenced the operation with the same world view as he, but the exposure of the Constables to the distress at the barriers had persuaded them to use their initiative. It is possible that distance from the crowd played a part in the different forms of behaviour exhibited by police officers.

After the Superintendent left the area the children were again lifted out of the crowd and placed in front of the barriers. If the barriers had failed, and caused the crowd to fall onto the children, the Constables would undoubtedly have been pilloried for their actions, but their view was that fatalities may have occurred if they had not acted.

As the day progressed, the Square became very congested, with surges from the rear of the crowd causing intense pressure against the barriers at the front. The 'show' on the Town Hall balcony increased in pace and energy. The Officers adjacent to the barriers were now removing adults who were suffering from distress and crush-related injuries. So great was the pressure at the front of the crowd that injured or fainting persons could not be removed without forcing back the people around them—they were gripped vice-like by the crowd and unable to move. The act of pushing people back to make the necessary space caused further injury.

The injured parties, who were suffering from suffocation, dehydration, fractured ribs and leg injuries, were taken to ambulances. After the event there was no de-brief and no attempt was made to learn from the day's events. This would tend to indicate that the event was seen only in terms of public order issues.

There are a number of similarities between the incident above and the Hillsborough disaster; for example, the delay in recognising the physical distress of some of the crowd. But there are also important differences between the two events. At Hillsborough there was the potential for aggression between rival supporters. This was not the case in the Square. This may have facilitated communication between police officers and

the public. At Hillsborough the supporters and police officers came from different cities. There was no shared civic identity. Again this was not the case in the Square. This might have made it easier for Constables to empathise with the crowd'.

Discussion

Of especial interest in this incident was a) the emphasis placed by the Officer Commanding on the maintenance of public order and b) the emphasis placed by the Officer Commanding on the need for strict adherence to his Operational Order regardless of the potential negative impacts on public safety. In this respect there are similarities between the aetiology of this near miss and the aetiology of the Hillsborough disaster. Having said this, however, there is one very significant difference between the two incidents - while the former ended without loss of life (although there were injuries to attendees), the latter saw 95 people killed and 400 seriously injured. The former developed into a crisis. The latter into a disaster. The most pertinent question, of course, is why the two incidents ended so differently. The answer may lie in the initiative shown by junior officers at the earlier incident. As the testimony recounts; 'Police officers, on their own initiative ... began lifting the smaller children out of the crowd ...'. It might be said that junior officers present at the earlier event were more flexible in their understanding of the reasons for and dynamics of the situation than those at Hillsborough. This may explain the different outcomes.

Other lessons can also be drawn. For example;

- the need to understand and plan for the public safety aspects of 'spontaneous' civic celebrations (while not dampening public enthusiasm and enjoyment and not offending civic pride, of course). Given that the football team at the centre of the celebration stood a reasonable chance of winning their Cup match, the most propitious course of action would have been for the Police, civic authorities, football club and other relevant parties to have got together well before the putative day of celebration to make contingency plans.
- the need for flexibility (but not formlessness) in command structures, and for effective and respectful two-way communication between upper and lower echelons. It is interesting to note that at both this incident and at the Hillsborough disaster potentially useful risk assessment information obtained

by those closest to the incident was either ignored or discounted by senior officers. While various intelligence-gathering technologies like CCTV can provide control room staff with potentially useful information, such images are, by definition, never more than a *mediation* of reality. They provide, at best, only an indication of the sociological and physical dynamics of an event. In light of such a limitation it would seem foolhardy to summarily exclude other intelligence-gathering mechanisms.

- the desirability, where appropriate, of delegating authority and responsibility to junior ranks (within a pre-determined procedural 'envelope'). If this incident and Hillsborough show us anything it is that senior officers are often too far removed from the locus of an offence or safety threat to be able to make informed and timely decisions. Delegating an appropriate measure of authority is one way of overcoming this structural/institutional barrier to effective control and timely decision-making. Of course, this is not to say that senior commanders should eschew all structural constraints. That way lies anarchy. But, as Toffler points out in his seminal *War and Anti-War*, the delegation of an appropriate measure of authority to, in this case, front-line troops, encourages initiative and flexibility and enhances responsiveness to novel situations, with consequent improvements in performance.
- the need to solicit intelligence from both the organisers of an event and the public when making ongoing risk assessments of a developing situation. This is an extension of the previous point. Again, it would seem churlish to ignore the advice of anyone - even stewards and attendees - who might be able to make a contribution to 'the big picture'.
- the need to be able to control the 'pace' of the entertainment to (in some degree) influence the mood and behaviour of the crowd. At the Hillsborough Inquiry it was commented that the event might have been better controlled had the kick-off time been delayed. The ability to make adjustments to the timetable of an event is an important resource for those responsible for public order and safety.

Conclusion

It is clear from the above testimony that we have as much to learn from 'near-misses' as from actual disasters. The key,

of course, is to persuade people to talk about actions and events that may, because of their potentially catastrophic outcomes, be painful and/or professionally compromising to recall. In the case described above, police officers were given no opportunity to discuss their experiences.

Consequently, the opportunity for isomorphic learning was lost. Perhaps the most alarming consequence of this missed opportunity is the thought that, had this incident been investigated, discussed and acted upon, it might have impacted the behaviour of the Police and other public and private authorities at subsequent sporting events—including Hillsborough.

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My sincere thanks to the senior officer who gave permission to use his narrative in this article. The officer has lived alone with the events of that day for too long.

The Author

Simon Bennett is a lecturer in Risk Studies at the Scarman Centre, University of Leicester, England. He has a PhD in industrial sociology from Brunel University, London.

His research interests include aviation safety and security and the socio-technical aspects of technological failure. He has published in numerous journals and periodicals, including 'Science, Technology and Human Values, Risk Management: An International Journal' and 'The Log: Journal of the British Airline Pilots Association'.

He directs the Centre's distance-learning MSc in Risk, Crisis and Disaster Management. email: sab22@le.ac.uk

Statutory immunities: when is good faith honest ineptitude?

Introduction

Often when dealing with emergency situations it becomes necessary for emergency service agencies to act, or omit to act, in ways that cause injury or death to people, or damage or destruction to private property. In some instances, due to the pressures of inadequate information and the necessity for quick decision making, the injury, death, damage or destruction caused by the agency's actions or omissions could have been avoided by adopting a different course of action, which may only become apparent with the benefit of hindsight.

At general law an agency or person who causes injury, death, damage or destruction to another is liable both under criminal and civil law for their actions or omissions. However, the law recognises that in certain circumstances a person is immune from prosecution or civil suit arising from their acts or omissions which under ordinary circumstances would amount to criminal offences or attract civil liability to the injured party. Some of these immunities are recognised by the common law, for example that military forces are not responsible for death, injury, damage or destruction caused during actual combat operations.¹ Other immunities are created by statute.

In general, immunities created by statute require that a person be acting in good faith for the immunity to protect them. This paper examines the current state of the law relating to immunities in the light of recent High Court and other superior appellate court authority, in order to provide some indication of the circumstances in which a person or agency will be immune from prosecution or civil suit, and the steps necessary to ensure that actions and omissions are made in good faith.

Immunities

A quick survey of Australian Legislation demonstrates that there are many situations in which a person is immune from civil and criminal liability for their actions carried out in the course of their duties. The immunities contained in legislation generally follow a common form, and are usually subject to the doctrine of 'good faith', or 'bona fides'.

by Mark Henry, Partner,
Maddock Lonie & Chisholm Lawyers

The following three immunities are of a type contained in Federal or State legislation:

Fire Brigades Act 1989 (NSW)

78. Protection from liability
A matter or thing done by the Minister, the Commissioner, any member of staff of the Department, any member of a fire brigade or any person acting under the authority of the Commissioner does not, if the matter or thing was done in good faith for the purposes of executing this or any other Act, subject such a person personally, or the Crown, to any action, liability, claim or demand.

Country Fire Authority Act 1958 (Vic)

18A. Immunity for officers etc.
An officer, member or employee of the Authority (not being a volunteer officer or member) is not subject to any action, liability, claim or demand for any matter or thing done or contract entered into by the Authority if the matter or thing is done or contract is entered into in good faith for the purposes of carrying out a power or duty of the Authority under this Act or the regulations or any other Act or regulations.

Fisheries Act 1995 (Cth)

142. Immunity provision
(1) The Minister, the Secretary, a delegate or deputy of the Minister or the Secretary, an officer of the Department, an authorised officer, a member of the Fisheries Co-Management Council, a member of a fishery committee, a member of the Commercial Fisheries Licensing Panel or a member or deputy of the Licensing Appeals Tribunal is not personally liable for anything done or omitted to be done in good faith -
(a) in the performance of a function or the exercise of a power under this Act; or
(b) in the reasonable belief that the act or omission was in the performance of a function under this Act.
(2) Any liability that would but for sub-section (1) attach to the persons specified in sub-section (1) attaches instead to the Crown.

An immunity will be utilised as a defence by an individual or entity who is being sued or prosecuted. The immunity will be effective provided the person relying on it can show they acted in good faith. It is incumbent upon the individual or entity relying on the defence to prove by adducing evidence they were acting in good faith.²

Good Faith

So what is the concept of good faith, and when will it cause an immunity to fail?

The Macquarie Dictionary defines good faith to mean: 'honesty of purpose or sincerity of declaration: to act in good faith.'

The leading Australian case in relation to concept of good faith is *Mid Density Developments Pty Ltd v Rockdale Municipal Council* (1993) 116 ALR 460. In that case the Federal Court of Australia held that the question of whether or not the concept of good faith embraces more than honesty will depend upon the statutory context. The Court found that the statute under consideration called for something more than 'honest ineptitude'.

This case establishes a basis which has been consistently applied in the interpretation of whether actions are in good faith and hence whether an immunity should stand. The case proposes that there will be subjective and objective tests applied to interpreting whether the actions of an individual are in good faith, and so protected by a statutory immunity.

There are two generally recognised tests of whether a person has met a standard imposed by the law. These are a subjective test which looks to the inten-

Notes

1. *Burmah Oil Co (Burma Trading) Ltd v Lord Advocate* [1965] AC 75; [1964] 2 WLR 1231; [1964] 2 All ER 348, Lord Reid at 99-101, Lord Pearce at 145-146. However military forces engaged in armed combat are subject to the treaties and conventions known as the Laws of Armed Combat and under the Australian Constitution the Commonwealth may be liable to pay fair compensation for property appropriated or destroyed by Australian or allied forces within Australia in circumstances amounting to less than actual combat operations against an armed enemy.

2. *Barrett and Ors v South Australia & Anor.* (1994) 63 SASR 208 per Bollen J.

3. *State of South Australia v Clark* [1996] 66 SASR 199.

tions and state of mind of the person involved, and an objective test which looks to what a notional reasonable person would have done in the same circumstances.

Following on from *Mid Density Developments*, arguably the subjective view might be that honest ineptitude is sufficient, whereas the objective view requires the exercise of caution and diligence to be expected of a reasonably competent person. On the objective view, it seems that demonstrating the existence of a breach of a duty of care will come close to also evidencing an absence of good faith.³ The issue then is which approach will be adopted and in what circumstances.

The subjective approach

There is a mistaken view that where a statutory immunity exists which is subject to good faith, the defence will only fail if there is evidence of bad faith and that the evidence of bad faith is misfeasance in public office. There is no doubt that misfeasance of public office will vitiate a statutory immunity defence, as by definition it requires bad faith.

The concept of misfeasance in public office was analysed by the High Court in *The Northern Territory of Australia & Ors v Mengel & Ors* (1995) 69 ALJR 527. Mengel owned two cattle stations in the Northern Territory. The Mengels purchased their property for \$3 million financing its purchase with a bank loan which they intended to repay with \$1 million from the sale of cattle by the end of the 1998 season. Two employees of the Northern Territory Department of Primary Industry and Fisheries (the inspectors) imposed restrictions on the Mengels moving their cattle because they believed the cattle were carrying a contagious disease. The prohibition placed on moving the cattle by the inspectors prevented their sale. The inspectors erroneously believed that their actions were authorised by law, which they were not.

The Mengels commenced proceedings against the Northern Territory of Australia and the inspectors individually on the basis that there had been misfeasance of public office.

The High Court (expressly rejecting *Beaudesert Shire Council v Smith* (1966) 120 CLR 145) determined that misfeasance of public office required a person to make a **conscious decision** to either act maliciously or outside the power conferred upon them by legislation. The Court went on to say that in so acting the individual had to foresee that their

act would result in damage or loss to a third party.⁴

The Court expressly said that this was a deliberate tort, in the sense that there was no liability unless either there was an intention to cause harm or the officer had knowingly acted in excess of his or her power.

If *Mengel* is an example of how the subjective test circumscribes good faith then it is a very narrow doctrine and an immunity would apply in all circumstances save where there was a **conscious** decision to act beyond power or with malice. Clearly in those circumstances there cannot be good faith.

The *Mengel* interpretation assumes that a reference to good faith in some contexts requires identification of the actual state of mind of the individual, irrespective of the quality or character of its inducing causes (i.e. something will be done or omitted to be done in good faith if the party honestly believes it, albeit that the act or omission was careless).

The subjective approach has been applied in a string of cases where the actual state of mind of the individual is the measure of whether an act was in good faith.

Lord Denning in *Central Estates (Belgravia) Ltd v Woolgar* [1971] 3 All ER 647 at 649, said:

*To my mind, under this Act, a claim is made 'in good faith' when it is made honestly and with no ulterior motive... (so as) to avoid the just consequences of misdeeds or failures.*⁵

In other words, for an act not to be in good faith, it would have to be made with dishonesty and with an ulterior motive.

Another narrow interpretation occurred in the *Board of Fire Commissioners v Rowland* (1961) 60 SR (NSW) 322 which was a case relating to a negligence action against the New South Wales Fire Service.

An officer of the New South Wales Fire Service was sent to a cinema to undertake an inspection to ensure compliance with the *Theatres and Public Halls Act* 1908.

During the course of the inspection the officer dropped his torch. Unable to locate his torch in the dark he utilised his cigarette lighter and in the course of doing so, slipped and ignited a felt curtain. He then failed to utilise a chemical fire extinguisher to put the fire out, but used his hands. Two hours later, the roof of the building was seen to be on fire and before it could be extinguished very substantial damage was done to the theatre.

The Fire Brigade sought to rely upon a statutory immunity contained in s 46 of their Act which provided:

The Board, Chief Officer or an officer of the Board, exercising any powers conferred by this Act or the by-laws, shall not be liable for any damage caused in the bona fide exercise of such powers.

The Court held in favour of the Fire Brigade. It determined that the immunity would stand, and that the activities of the fire service were bona fide or in good faith. Whilst the term 'bona fide' does not appear to have actually been argued, it is inherent in the judgment that a narrow interpretation based on the subjective view as described by Lord Denning in *Central Estates* was adopted. Interestingly the Court said:

*Expressions of this kind have been used in many statutory provisions designed to protect individuals against the possible consequences of acts not actually authorised by law but done in a conscious attempt to perform a public duty.*⁶

R & W Vincent Pty Ltd v Board of Fire Commissioners of New South Wales [1977] 1 NSWLR 15 is a case with a similar fact situation. In that case Windeyer J stated that where the immunity applies it protects the person from liability for damage resulting from acts which are done in good faith and directly in the exercise of a power that the statute conferred, whether the acts are done skilfully or negligently. In other words, an officer expressly empowered to do something can decide, not only that it is to be done, but how it is to be done — and his actions, directions and decision cannot, if done in good faith, be later canvassed before a court on the ground that they were imprudent or that what was done was done in a negligent manner.

Numerous cases demonstrate a subjective approach to assessing good faith. An appropriate basis for application of this test is arguably highlighted in the fire services cases where an immunity is required to protect an agency from liability in relation to what might otherwise be unlawful acts.

It is the balance between the need for public service agencies to be protected from litigation or criminal liability arising out of the exercise of their powers and

Notes

4. There is debate about whether the issue of foreseeability is a requirement — see *Three Rivers District Council and Others v Bank of England* (No. 3) [1996] 3 All E.R. 558 at 559 to 577.

5. Approved in *Smith v Morrison* [1974] 1 ER 957 at 968 per Plowman J.

6. In *Board of Fire Commissioners v Ardouin* (1961) 109 CLR 105—Dixon C J limited the immunity to protection of a statutory power which would otherwise be illegal.

the rights of the public to be compensated for personal or property injuries caused by the negligence of public service agencies or their personnel which was subsequently discussed in *Mid Density Developments* and subsequent cases.

The Objective Approach— *Mid Density Development v Rockdale Municipal Council*

Facts

In this case the appellant was a developer who, on 19 October 1990, entered into an agreement to purchase a property. In January 1991 the developer submitted to the local council an application for development of the land. The council eventually approved the development application subject to a large number of conditions, including that the floor level of the proposed units on the land be raised above a minimum level in conformance with a policy that had been adopted by the council in April 1991. This had the effect of making the proposed development unprofitable.

In March 1990 the council had issued certificates under section 149 of the *Environmental Planning and Assessment Act 1979* (NSW) ('EPA') to the appellant's solicitors. Annexures to those certificates stated that the council had no information to indicate that the land was subject to the risk of flooding or tidal inundation. Further certificates in the same terms were issued to the applicant on 26 October and November 1990. The applicant had relied on these certificates when it decided to purchase the land.

Between the time the contract was completed in October 1990 and April 1991 the council had changed its flood management policy for the area based on information available to it for a number of years prior to 1990.

At the first hearing the trial judge found that the council officer who had completed the section 149 certificates had not referred to any files, studies or other information but merely relied upon his general knowledge when he completed the answers in the certificates. The trial judge therefore found that the council officer had been negligent. The council, however, successfully relied at trial on the defence of 'good faith' set out in section 582A of the *Local Government Act 1919* (NSW) ('LGA') and section 149(6) of the EPA.

Section 149 of the EPA stated that:

(5) A council may, [in a section 149 certificate] include advice on such other relevant matters affecting the land of which it may be aware.

(6) A council shall not incur any liability

in respect of any advice provided in good faith pursuant to sub-section (5). Section 582A(1) of the LGA stated that: A council shall not incur any liability in respect of:

(a) any advice furnished in good faith by the council relating to the likelihood of any land being flooded or the nature or extent of any such flooding.

Section 582A(5) stated that:

This section applies to and in respect of...

(b) A member or servant of a council or of any such body or authority; ... in the same way it applies to and in respect of a council.

Finding

On Appeal the Full Court of the Federal Court of Australia (Gummow, Hill and Drummond JJ) found that the applicant had specifically relied on the issuing of the section 149 certificate by the council before it entered into the contract on 19 October 1990.

The court held that the Council owed a duty of care to the appellant because the relevant class of persons who may rely on such a certificate included potential purchasers of the property which was the subject of the certificate. The court held that it was sufficient if the negligent misstatement by the Council was made to members of a limited class of persons which included the plaintiff and the plaintiff was entitled to recover damages from the Council, subject to any defences.

It was therefore necessary for the court to consider whether the defence of 'good faith' set out in section 582A of the LGA and section 149(6) of the EPA Act could be made out.

The court found in relation to the concept of 'good faith' that:

1. 'Good faith' could have two meanings depending on the context in which it was used. These meanings were as follows:

1.1 An actual state of mind, irrespective of the quality or character of its inducing causes. Something will be done or omitted in good faith if the party was honest, albeit careless. This is a subjective test.

1.2 On the other hand, 'good faith' may require that exercise of caution and diligence to be expected of an honest person of ordinary prudence. This is an objective test (ie something more than honest ineptitude).

2. In the present case, it would be wrong to assume that the phrases in section 582A and 149(6) operated to leave the council liable only in respect of

misfeasance of public office. The court found that those provisions were designed to strike a balance between:

2.1 the interests of the authority which is funded by public not private funds and which, pursuant to statute, provides the information; and

2.2 the interests of the recipient of the information and others reasonably acting upon it where, in the ordinary course, those persons may be expected to incur substantial liability on the faith of what is disclosed by the authority.

3. The EPA and the LGA did not have the effect that the individual interest should yield to the wider public interest only if the conduct of the authority was dishonest.

4. A party in the position of the council could not be said to be acting in 'good faith' within the meaning of the EPA or the LGA if it issued section 149 certificates where no real attempt had been made to have recourse to the vital documentary information available to it (even if an error is made in the inspection or representation of the results).

5. The statutory concept of 'good faith' with which the EPA and the LGA were concerned called for more than honest ineptitude. There must be a real attempt by the statutory authority to answer the request for information at least by recourse to the materials available to it.

In short then *Mid Density Developments* stands for the proposition that, in certain circumstances, the test of whether actions are bona fide or in good faith will be based on the exercise of caution and diligence to be expected of an honest person of ordinary prudence. This is confusing because it sounds akin to the imposition of a duty of care onto the officer. However, amplification of the requirement is contained in *Barrett & Ors v State of South Australia* (1994) 63 SASR 208 and *State of South Australia v Clark* (1996) 66 SASR 199.

Barrett and others were the former directors of the State Bank of South Australia. They were sued by the State of South Australia for damages in negligence arising out of their performance of duties as directors of the bank. The directors had authorised the acquisition of share capital in Oceanic Capital Corporation Ltd at a price which exceeded its actual value by about \$30 million when the true value of Oceanic Capital could have been ascertained by an independent valuation prior to acquisition.

The former directors relied on section 29 of the *State Bank of South Australia Act* 1983. That section provided a director an immunity from liability for 'an act or omission done or made, in good faith, and in carrying out, or purporting to carry out, the duties of his office'.

The Full Court of the South Australian Supreme Court agreed with *Mid Density Developments* and stated that it would be wrong to give the term 'in good faith' a precise or narrow meaning. The Court made it clear that 'good faith' within the parameters of s 29 of the Act entailed more than honesty. In adopting the *Mid Density Developments* decision, Bollen J said the protection provided by s 29(1) of the Act did not extend to cases of gross negligence or to cases where there is no real attempt by the director to fulfil the duty of care and diligence imposed upon him by his position.

The relevance of *Barrett's* case is that it makes a distinction between the actual duty of care, and an attempt to fulfil that duty.

State of South Australia v Clark arose out of the same fact situation, but as separate proceedings. Mr Clark was the Managing Director and Chief Executive Officer of the State Bank of South Australia, but also had a conflict of interest in so far as he was a shareholder in the parent company of Oceanic Capital and failed to declare his conflict of interest.

The Court similarly agreed with of the decision in *Mid Density Developments*. Perry J said:

The fact remains that there will be cases, of which the Mid Density case is an example, where the failure to discharge the duty of care required of the director in question is of such a nature that it could not be said that the director is acting in good faith.

These cases clearly confuse the issue of good faith and duty of care. On a proper analysis, however, it is submitted that Bollen J's position, that what is required is not action in accordance with an objective standard, but rather an attempt to satisfy that objective standard, is correct.

This position has been better explained in *Attrill v Richmond River Shire Council* (1995) 38 NSWLR 545

In that case the appellants were the owners of a dairy farm situated between the Richmond River and the main road owned by the council. Prior to roadworks conducted by the council the property drained generally southwards by way of an existing continuous depression with various culverts under the road to take away excess water. Following the flooding of the river the council raised the surface

of the main road but did not carry out work on the culverts to increase their water bearing capacity. The appellants argued that, as a result of the increased height of the road, the area of land inundated by flood waters retained by the roadway had increased. The New South Wales Court of Appeal determined that the council had acted in good faith and was immune from civil liability. The Court made reference to the policies and considered the material required under the legislative scheme. The Court carefully analysed the language of the immunity and determined Parliament's intention was clear. The council had, unlike the position in *Mid Density Developments*, considered the relevant material and then determined a course of action. The Court did not make a finding of fact that the course of action taken by the council was negligent but, merely noted that it had attempted to perform its duty or had at least considered the reports and made appropriate enquiries.

Situations in which the objective test has been applied seem to concern legislation which, rather than protecting an individual from liability for performing acts which are otherwise unlawful, is aimed at mitigating against the risk of civil action (ie acts that without the immunity would not be unlawful). The fact is that, based on the applicable criteria detailed in relation to *Mid Density Developments*, the objective test was adopted.

Implications of Pyrenees decision on statutory immunities and the concept of good faith

Pyrenees decision

In *Pyrenees Shire Council v Day & Anor* (1998) 151 ALR 147 the High Court considered the consequences of a council's failure to properly exercise its powers to ensure that premises within its municipal district did not pose an undue risk of fire.

Facts

The facts in *Pyrenees* can be briefly set out as follows:

1. In 1988 a building and scaffolding inspector employed by the council inspected the chimney of a retail shop following a small fire attended by the CFA. The inspector subsequently wrote to the then occupier of the premises warning that the fireplace must not be used unless it was repaired.
2. The council did not make any further inquiries to determine if the fireplace had been repaired or if it was no longer being used.
3. In January 1990 the tenants of the

premises where the chimney was located assigned the lease to new tenants who occupied the premises after that time.

4. The former tenants did not inform the new tenants of the letter from the council and did not advise them not to use the fireplace.
5. A fire occurred as the result of the fireplace's use in May 1990. The fire destroyed the premises where the chimney was located and seriously damaged the adjoining premises.
6. The majority of the High Court found that the council owed a duty of care to exercise its statutory power to prevent the damage caused by the fire. That duty was owed to the occupiers, the lessee, the owner of the premises and the owners of the adjoining premises.

Legislation

The statutory framework that was relevant to the *Pyrenees* decision was as follows:

1. The legislation under which the council had a power to inspect the premises was section 695(1A) of the *Local Government Act 1958 (Vic)* ('LG Act') then in force. That section stated that:

For the purpose of preventing fires the owner or occupier of any land upon which is erected any chimney or fire-place which is constructed of inflammable material or which is not adequately protected so as to prevent the ignition of other adjacent material of an inflammable nature may by notice in writing be directed by the council of the municipality within the municipal district of which such land is situated to alter the fire-place or chimney so as to make it safe for use as a fire-place or chimney, as the case may be.

2. When notice was given by the council under section 695(1A), section 890 of the LG Act provided that the person to whom notice was given was bound to comply with that notice. Section 891 imposed a penalty for failure to comply.
3. Section 885 of the LG Act authorised the occupier of a building to, with the approval of the council, carry out work and charge the owner of the building where the owner defaulted in complying with a notice requiring them to execute work.
4. Section 694(1) of the Act provided that if neither the owner nor the occupier complied with the notice requiring work to be done to prevent fire:

The council of any municipality

may carry out or cause to be carried out any works or take any other measures for the prevention of fires.

The effect of these provisions is that the fire-prevention powers of the Council were adequate, if fully exercised, to ensure that the defect in the fireplace was remedied and that, until it was remedied, no fire would be lit in the fireplace.

The *Pyrenees* decision is difficult to summarise because each of the five judges gave separate judgments. However, the key points of the case for the purpose of this paper are as follows:

1. The majority found that the Shire owed a duty of care to the owners and occupiers of the premises where the fire occurred as well as the occupiers of the next door shop, which was breached.
2. The majority found that a duty of care can be based upon the existence of a public authority's discretionary statutory power.
3. The majority rejected the view that general reliance was necessary to establish a duty of care.

Unfortunately the three majority judges chose to set out different factors that a court may take into account in determining whether a common law duty of care will be imposed where a public statutory authority has failed to exercise its statutory powers. Despite this, it is possible to obtain some guidance as to the relevant factors which a court may take into account. The majority judges found that where a public authority becomes aware of the existence of a danger to life or property in relation to which it has a discretionary power to act, it may become liable in damages if it does not exercise that power. This liability will arise where:

1. the authority has knowledge of a grave danger to a definable class of people or their property
2. the people concerned are unaware of that danger and are unlikely to become aware of it
3. the authority has statutory powers enabling it to avert or prevent the problem
4. there are no policy considerations which prevail to override the duty

Specific reliance by the plaintiff on the public authority exercising its power is not essential.

Comparison of *Pyrenees* decision and principles of 'good faith'

Section 166A of the LG Act was an immunity provision that was applicable

to the activities of the council inspector who wrote the letter to the occupier of the premises. That section states:

(1) *Nothing done or omitted and no contract entered into by any officer or employee of the council shall if the act or omission occurred or the contract was entered into bona fide in the course of his functions as such officer or employee subject any such officer or employee personally to any action, liability, claim or demand whatsoever.*

The meaning of the term 'bona fide' is the same as that of 'good faith'.

The difference between the provisions in the LG Act then in force and the relevant provisions under consideration in *Mid Density Developments* is that there is no provision providing an immunity to the council itself in the LG Act. An immunity is only extended to officers of the council.

If such a 'good faith' provision providing an immunity to the council had existed as it did in the *Mid Density Developments* case:

1. It is likely that the council would have met the subjective 'good faith' test in that the council inspector did not act dishonestly.
2. The council probably would not have acted in 'good faith' in accordance with the broader objective test set out in *Mid Density Developments* as there was not a genuine attempt by the council to perform its function correctly. This would have been a matter to be determined by the court after weighing up a number of factors.

The factors identified by the majority judges in *Pyrenees* in determining whether a common law duty of care will be imposed where a public statutory authority has failed to exercise its powers share some similarities with the statutory defence of 'good faith' as set out in *Mid Density Developments*. These similarities are as follows:

1. The knowledge of the danger held by the public authority and the relevant class of people.
2. The need to closely examine relevant legislation to determine whether the powers conferred on the public authority warrant the imposition of a duty of care.
3. The significance of policy considerations.

Knowledge of the danger

In *Mid Density Developments* one of the key considerations in determining the broader meaning of 'good faith' concerned the interests of the recipient of the

information and others who incurred substantial liability on the faith of what was disclosed by the public authority.

Some examples of this factor in *Pyrenees* are as follows:

1. Gummow J stated that, unlike the council, the tenants of the two properties at the time when the fire occurred did not know of the imperative need for something to be done. He stated that their ignorance was the product of the incomplete and inadequate course of action taken by the council which was aware of the danger and had the means of preventing or averting it or bringing it to the tenants' knowledge (page 192).
2. Brennan CJ stated that, consistent with the purpose of arming a council with fire-prevention powers, a council that knows of a risk by fire to persons or property cannot refuse to exercise its fire-prevention powers where an exercise of those powers would protect those persons or property, unless the council has some good reason for not doing so (page 154).
3. One of the public policy considerations identified by Kirby J for rendering the council liable related to the opportunity which the plaintiffs had to inspect and appreciate the source of danger to them. Kirby J identified that, in the balance of the possession of relevant information, the council was at an enormous advantage and the plaintiffs were at a profound disadvantage (page 222).

Determination whether the powers conferred on the public authority warrant the imposition of a duty of care

Another factor considered by the court in *Mid Density Developments* was that the council should have made a real attempt to have recourse to the vital documentary information available to it in order to be acting in 'good faith'. The court also stated that there must have been a real attempt by the statutory authority to answer the request for information at least by recourse to the materials available to it. In following the line of argument through *Barrett v State of South Australia* and *Clark v State of South Australia* there must have been an attempt by the person relying on the immunity to have fulfilled the duty of care.

Pyrenees poses some interesting propositions with respect to this analysis. These are as follows:

1. Brennan CJ stated that the care and diligence needed to discharge a duty vary according to the circumstances which are known to the defendant. It is

therefore presumed that the attempt to discharge the same duty will similarly vary. He stated that where there was a risk of fire that could destroy a large part of a township, the care and diligence to be exercised is greater than where the risk is of an escape of fire that poses a threat only to an isolated structure or to crops, trees or pasture within a confined area. He therefore found that the council was under a public law duty to enforce compliance with the requirements in the inspector's letter. The risk of non-compliance was extreme for lives and property in the neighbourhood of the defective chimney (page 158). If the duty varies the distinction between the attempt to fulfil the duty and the actual duty, any meaningful application of the good faith test will be impossible.

2. One of the considerations identified by Kirby J for rendering the council liable was the statutory power in question, which his Honour said was not simply another of the multitude of powers conferred upon local authorities such as the council, but was a power addressed to the special risk of fire. Kirby J also identified that, where a public authority enters upon an exercise of its powers, it must do so carefully. He stated that had the action taken by the council been competent and careful, the damage suffered by the plaintiffs would probably have been avoided (page 219). Kirby J also stated that the peril that was foreseen rendered it fair, just and reasonable that the council should have exercised its powers (page 222).
3. Gummow J identified that the situation occupied by the council as the arm of local government gave it a significant and special measure of control over the safety from fire of persons and property in the street where the premises were located. He stated that the touchstone of the council's duty was its measure of control of the situation, including its knowledge, not shared by the plaintiffs, that if the situation were not remedied the possibility of fire was great and damage to a whole row of shops might have occurred (page 192).

Significance of policy considerations

In *Mid Density Housing* the court considered the public policy reasons for the immunities, including that the provisions were designed to strike a balance between the interests of the authority and the recipient and in what circumstances the individual interest should yield to the wider public interest.

Some examples of policy considerations undertaken by the majority judges in *Pyrenees* are as follows:

1. One of the three tests identified by Kirby J in determining whether a legal duty of care exists was if it was fair, just and reasonable for the common law to impose a duty of care upon the council for the benefit of the plaintiffs. Some of the matters considered by Kirby J included the degree of danger to which the claimant was exposed by the omission of public authorities to exercise statutory powers, the expertise available to the authority, the opportunities of intermediate self-protection, the cost and inconvenience involved in the authority's exercise of its powers, the promotion of individual choice and the efficient use of resources, the size and resources of the council and the undesirability of adopting a rule which would result in insurance companies recouping their expenses from the purse of a public authority (pages 219-221).
2. Gummow J identified that questions of resource allocation and diversion and budgetary imperatives should fall for consideration along with other factual matters to be balanced out when determining what should have been done to discharge a duty of care (pages 195-196).

There is a unique conflict here in so far as it seems public policy on the one hand dictates that, where a public authority alone is in a position to provide information and to act, a failure to do so would evidence a failure in the exercise of the ordinary prudence and diligence expected of an honest person. This would mean that no good faith immunity would apply. This flies in the face of the intent of the statutes which confer such an immunity.

Conclusion

Emergency Services will be able to avail themselves of a statutory immunity and their acts will be regarded as bona fide on the subjective test, where their actions would otherwise be unlawful and/or are acts required to be performed in exercise of their statutory function.

Whilst the *Pyrenees* decision did not specifically consider the issue of 'good faith', it is interesting that many of the factors weighed up by the Full Court of the Federal Court in *Mid Density Developments* in relation to whether or not the council had acted in 'good faith' within the broader meaning of the term were similar to the factors the majority judges in *Pyrenees* identified as being relevant to whether a duty of care will be imposed where a public statutory authority has

failed to exercise its powers. The High Court's development of the law in relation to the liability of public authorities for failing to exercise a statutory power in the absence of specific reliance shares some distinct similarities with the development of the statutory defence of 'good faith' in relation to an officer of a public authority or the authority itself. These developments make it almost impossible to assess in what circumstances a statutory immunity defence aimed at risk mitigation will succeed and where it will not. The difficulty in making any practical distinction between an attempt to fulfil a duty and the actual satisfaction of the duty means whether or not a court considers an act is in good faith will depend on issues of public policy.

In summary, I am of the view that the following trends can be discerned:

1. An immunity will be enforceable and the principle of good faith assessed on the subjective test where the immunity is required to make an unlawful act lawful.
2. In circumstances where the immunity operates to mitigate risk, the good faith principle will be measured against competing public policy issues.
3. The public policy issue relevant to determining if an act is performed in good faith will be measured by an **attempt** to satisfy a standard of care.
4. The reality of measuring the **attempt** to satisfy the standard of care and actually satisfying the standard is confused.
5. The public policy considerations relevant to the application of the immunity will have to be assessed by the courts on the facts of each case.

In short, there are real unresolved issues about when an immunity will apply, even given their unambiguous statutory intent.

About the Author

Mark Henry is a Partner of the Melbourne firm Maddock Lonie & Chisholm. He has a Bachelor of Arts and a Bachelor of Laws. He is a member of LawAsia and the Law Council of Australia. Mark acts for both the Victorian Country Fire Authority and Metropolitan Fire and Emergency Services Board and has represented the CFA at coronial inquests including the forthcoming inquest into the deaths of 5 CFA volunteers at Linton in 1998 and the Royal Commission into the Esso Longford Gas Plant Accident.

Mark heads Maddock Lonie & Chisholm's emergency services team and has particular expertise in emergency services and their interface with the private sector. He regularly advises on administrative law, statutory interpretation, contractual matters and large projects.



Coping with flood: the experience of the people of Dhaka during the 1998 flood disaster

Introduction

The increase in human pressure on the environment, such as over-exploitation of resources and uncontrolled construction of buildings and infrastructures has, in the last few decades increased the effects of natural disasters in terms of human loss and damage to properties. Among the major risks, floods are considered to be of main importance with regard to their consequences.

Although flood is an annual event in Bangladesh with 18 percent of the land area flooding during the monsoon season every year, the loss of life and damage to property has increased quite significantly during the last few decades. The floods of 1988 and 1998 were particularly devastating.

In 1988, approximately two-thirds of the country was inundated, affecting 50 million people and killing 1,600. The greater Dhaka area was hit by this catastrophic flood during the months of August and September—about 56 percent of the greater Dhaka area was submerged affecting about 1.9 million people (JICA 1990). While no official figures of flood damages in Dhaka are available, the Dhaka city corporation estimated that some 400 kms of roads were damaged. From the estimates of JICA, an area of 137 kms² which includes the major built-up part of greater Dhaka, sustained flood damage estimated to be in the order of Tk. 500 millions to Tk. 1000 millions (US\$9.8–19.6, One US\$ = Tk. 48).

The 1998 flood was an unprecedented event of its kind in terms of duration, area inundated and damage sustained (DMB 1998). The overall duration of the flood throughout the country was 65 days while the longest duration was 73 days at a single point. The flood inundated nearly 100,000 sq kms, 52 districts, and affected more than 30 million people. Total economic damage amounted to nearly 3 billion dollars (US).

Dhaka city was also severely affected by the 1998 flood. Seventy out of ninety wards of the Dhaka city corporation were under water of various depths for more than eight weeks. The flood affected

by Sarwar Jahan, Professor of Urban and Regional Planning, Bangladesh University of Engineering and Technology, Dhaka

almost all aspects of human life. Not only physical assets, but also income, health and occupation. People of various income and occupation suffered in varying degrees, and there were also significant spatial variations in the impact of the flood.

This paper presents the results of a study that was undertaken to determine the nature and degree of impact of the flood on the various socio-economic groups in Dhaka city and the mechanisms through which people coped with the flood. The study was carried out in four areas in the eastern part and one area in the southern part of the city. Data were collected from a total of 294 households via a questionnaire survey. For the purpose of the survey, each area was divided among 8 groups of investigators. Each group was then assigned a small cluster within each sub-area. Households were then selected from each cluster following a systematic sampling procedure.

Socio-economic characteristics of the population

Heads of households from five different areas were interviewed—about 95% of them were male. The majority of respondents (30.61%) belonged to the age group 30 to 40 years, while 22.55% were in the age group 41 to 50 years or older. 17.68% were in the age bracket 51 to 60 years while the rest belonged to the age group 21 to 30 years.

Education and occupation

Nearly 31 percent of the respondents were illiterate, 9.2 percent passed Secondary School Certificate or Higher Secondary Certificate examinations while 15.6 percent earned Bachelor's or Master's degrees. The rest attended schools at primary or secondary levels. Business was the occupation of about 18 percent of the respondents followed by service (15%), petty business (13.7%), Rickshaw pulling

(13.3%) and daily labor (10%). About 23 percent of respondents were engaged in various other types of jobs including professional activities, factory work etc. Nearly 7 percent were unemployed.

Household income

People of different income groups were affected by the flood. 19.4 percent of households belonged to the lowest income group with monthly incomes of up-to Tk. 2999 (US\$58.97). The largest number of households (40.8%) were in the group having monthly incomes between Tk. 3000 and Tk. 5999 (US\$58.99–235.96), while 22.1 percent of the households surveyed earned between Tk. 6000 to Tk. 11999 (US\$117.99–235.96). Households earning more than Tk. 12000 (US\$235.98) constituted about 17.7 percent of the total number of households. Average household income in the affected area were found to be Tk. 10,679 (US\$210.01).

Depth and duration of the flood

The flood affected mainly the eastern part of the city. The western part was protected by the Dhaka City Flood Protection Embankment. The depth of water, however, varied in different parts of the affected area. In Kamrangir Char, which was the worst affected area, the water level reached the rooves of about 45% of the dwelling units. Overall analysis showed that nearly 83% of houses were under 3 feet of water or more. The water level reached the rooves of about 19 percent of houses and half the dwelling height of about 31 percent of the houses in the affected areas.

The duration of the flood was one of the longest in recent history, lasting for more than two months in many places. Sixty percent of houses in the affected areas of Dhaka City remained flooded for more than 60 days while nearly 25 percent of the houses remained under water of various depths for about 51 to 60 days. Only 10 percent of the households mentioned that the duration of the flood was 30 days or less.

Living with the disaster

Those affected by the flood tried to cope

with the disaster in various ways. Many moved out of the flooded area and took shelter elsewhere. Poorer people were severely affected, and many had to borrow money to survive. Some even sold assets or mortgaged their properties as they lost their jobs or incomes. Governmental agencies, non-governmental and voluntary organizations, and private individuals also came forward with relief materials.

Moving to safer places

Almost one-third (32.7%) of the flood-affected households had to leave their houses and take shelter elsewhere. Nearly 56 percent of these households had to evacuate all of their members while about a quarter of the households (24%) had to evacuate women and children. The rest of the households left behind a servant or a member of the family to guard their property.

The majority of those who left their home took shelter in a relative's house. Nearly 19 percent of the evacuee households stayed with their relatives in the locality while about 33 percent of them stayed with their relatives outside the locality. A significant proportion of the households (22.2%) took shelter in high-rise buildings in the locality. Only a small percentage (10%) of the households took refuge in schools, Madrashas or other informal flood shelters. The remaining households rented houses in flood-free areas.

Facing the deluge

About 67 percent of those surveyed did not leave their homes. The majority (51%) stayed at home to guard their properties while about 17 percent of the households mentioned that they could not move out as there was no shelter nearby or the available shelter was not suitable. Nearly 19 percent of the households thought that the situation was not serious enough and did not pose any risk. Various other reasons were mentioned by about 13 percent of the households.

People, however, had to make alternative arrangements to remain in their houses, as there was water inside. The majority of the households (45.5%) had to live on an elevated platform constructed after the flood water entered their houses. Another 30 percent had to stay on the roof of the house since water almost reached the ceiling. The rest of the households, however, did not make any such arrangement since water did not pose any problem.

People faced various problems while staying in their flood-affected houses. These included a shortage of drinking

water, shortage of food, getting wet by rain water, the possibility of snake-bite etc. Most people (86.8%) mentioned shortage of drinking water as the main problem, followed by shortage of food (62.5%) and getting wet by rain water (56.6%). Rain posed serious problems for those who stayed on the roof of their house.

Various diseases broke out during the flood. Approximately 76 percent of respondents mentioned that one or more household members suffered from diseases like diarrhoea, dysentery, virus fever, jaundice etc. Diarrhoea was widespread with nearly 24 percent of respondents mentioning that one of their household members had suffered from this disease. Seventeen percent of households had 2 or more members suffering from this disease.

There was also an epidemic of virus fever with at least one member of nearly 51 percent of households affected. Dysentery or jaundice also affected about 31 percent of households.

People also suffered heavily due to increases in household expenditure during the flood. Expenditure on food, medicine and transportation was considerably higher than previously. Average monthly household expenditure on housing, food, medicine and transportation together was Tk. 7568 (US\$148.85) during the flood compared to Tk. 6367 (US\$125.21) before the flood indicating that there was nearly a 19% increase in household expenditure during the flood.

Confronting the challenge of income and job loss

The poorer sections of society, especially the rickshaw-pullers, day-labourers,

factory workers and petty businessmen were hard-hit as the flood lasted for nearly two months. Many used up their savings and even had to borrow to survive. Some people sold assets and mortgaged properties to buy food and daily necessities.

The study indicates that nearly 44 percent of households had to borrow money to survive, mainly to buy food. Thus nearly 86 percent of borrowers bought food with the money they borrowed. About 30 percent of households borrowed money for the purpose of treatment. Some households (11.8%) needed money to repair their house while others (10%) used the borrowed money to rent a house in a flood-free area.

Relatives, neighbours and local shopkeepers were the major sources of credit (figure 1). Nearly 36 percent of borrowers received credit money from their relatives. Nearly 23 percent of borrowers received money or goods on credit from local shopkeepers, and a significant proportion of households (22.2%) received credit from neighbours. Some households also borrowed from friends (10.2%), Mahajans (6.5%) and non-governmental organisations (6.5%). It is interesting to note that most people borrowed money from informal sources. The role of non-governmental organisations in providing credit was quite insignificant.

Quite a good number of households even sold assets like jewellery, furniture etc. They constitute about 19 percent of the households affected. Forty-one percent of those who sold assets sold jewellery, while 31 percent sold furniture. The remaining households sold various other things. Most of them (87%),

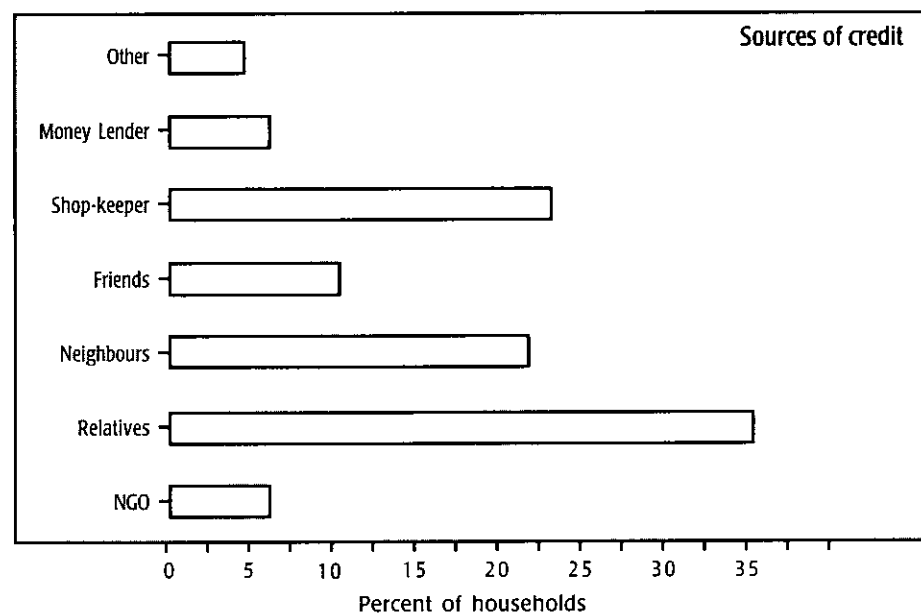


Figure 1: Distribution of households by sources of credit

Types of assistance	Governmental agencies	Non-Governmental Organisations	Voluntary Organisations	Other
Food	29.80	23.08	43.27	11.54
Clothing	0.96	1.92	2.88	1.92
Housing Materials	0.96	0.00	0.96	0.00
Medicine	6.73	10.57	15.38	4.81
Water Purification Tablet	6.73	8.65	13.46	2.88
Money	0.00	4.81	8.65	0.96
Other	0.96	1.92	0.96	1.92

Table 1 : Percentage distribution of households by types and sources of assistance

Damaged aspects	Nature of damage		
	Fully damaged	Partly damaged	No damage
Food	1.00	15.8	83.2
Clothing	3.8	26.3	70.00
Housing	16.8	60.8	22.3
Furniture	13.2	59.9	26.9
Income	28.20	41.20	30.60

Table 2 : Percentage distribution of households by nature of damage

however, did not receive the right price.

The main reason for selling assets was to buy food and nearly 85 percent of households used the sale proceeds for this purpose.

About 35 percent of households also mentioned treatment of patients as a reason for selling assets. This was not unusual given the fact that various types of diseases broke out during the flood. Repairing the house or renting a house in a flood-free area were other reasons for which people needed to sell assets.

Help and assistance was also received from various public and private organisations in terms of food, clothing, housing materials, medicine, water purification tablets, money etc.

Nearly 35 percent of the households surveyed mentioned that they received such assistance. The percentage distribution of households by types of assistance and sources is presented in Table 1.

The majority of households received food from various sources. What is interesting to note is that more people received assistance from voluntary organisations than any other organisations including governmental agencies and non-governmental organizations. This is true not only for the total number of households receiving aid but also for the number of households considered separately for each type of assistance such

as food, clothing, water purification tablets, medicine etc.

Flood damage

People suffered extensive damage due to the flood. The flood affected almost all aspects of life and caused severe damage to food, clothing, health, housing, furniture and income.

Table 2 presents the distribution of households by damage type and the nature of damage. Damage to housing, furniture and income was found to be quite high in terms of the proportion of households affected. Damage to income was highest so far as the proportion of households suffering complete loss of income.

The proportion of households experiencing some kind of damage (complete or partial) was, however, largest in the case of housing. Figure 2 shows the average damage to various aspects in terms of money. The flood caused extensive damage to housing averaging about 6277 Takas (US\$123.44) for a household. Loss of business income, damage to furniture and loss of jobs were also quite significant and amounted to Tk. 4253, (US\$83.63) Tk. 2126 (US\$41.80) and Tk. 1396 (US\$27.45) per household respectively.

Recovery from flood damage

The survey was carried out about 3

months after the flood. Respondents were asked if they had recovered from the various types of damage inflicted by the flood. Figure 3 presents the distribution of households by the extent of recovery from flood damage. About 40 percent of households recovered completely while about 44 percent of households recovered partially. About 16 percent of households did not recover at all. The percentage of households recovering completely, however, varied across occupational groups. Fifty to seventy percent of businessmen, service holders and professionals (doctors, engineers, teachers etc) recovered completely from flood damage with professionals having the highest rate of recovery.

On the other hand, households recovering completely varied between 26 to 37 percent for petty businessmen, rickshaw-pullers, factory workers and day labourers indicating that low-income groups constituted the major victims of the flood.

The majority of households (67%) tried to fix the damage using their own resources and did not accept any outside help. They mainly used their past savings or resorted to borrowing. About 9 percent of households accepted the help of their relatives to recover from flood damage while 19 percent of households mentioned various other sources including friends, local influential people, local shop-keepers etc. What is interesting to note is that people received very little help from institutional or formal sources such as governmental agencies or non-governmental organisations (figure 4). This result confirms previous findings that the largest proportion of affected people received financial help and credit during and after the flood from non-institutional sources such as friends, relatives and neighbours (Elahi 1988; Hossain 1990).

Managing the flood disaster

Disaster management activities relating to flood involve both structural and non-structural measures. Structural measures aim to protect an area up to a certain level of flooding, while non-structural measures aim to reduce the social and economic adverse impacts through flood forecasting and flood warning systems, evacuation of people to safer places, food storage facilities, credit systems to recover from flood damage etc.

In Bangladesh, as elsewhere, the application of such measures and their implementation belong to different government agencies. The Bangladesh Water Development Board (BWDB) is the

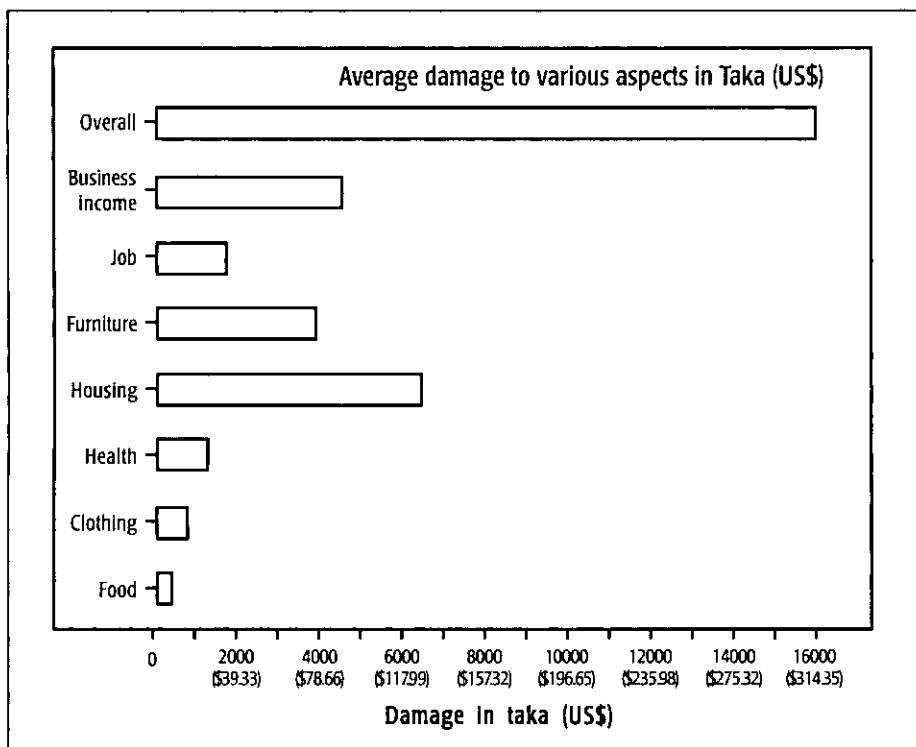


Figure 2: Distribution of households by sources of credit

key agency in planning and implementing flood control and other water related projects. There are about 332 flood control and drainage projects in Bangladesh with 6134 kms of embankments, 4521 hydraulic structures and 985 river closures (Shahjahan 1998). Many other projects are, however, currently under development. Existing projects provide flood protection for an area of 34 percent out of a flood vulnerable area of 59 percent. On completion of the on-going projects about 57 percent of the flood vulnerable area will come under flood protection measures.

Non-structural measures that are carried out by various Ministries and Agencies are mostly restricted to emergency relief and rehabilitation. Flood

preparedness and flood fighting capabilities are now very limited. There is a disaster management council under the chairmanship of the country's Prime Minister, that includes representatives of various ministries, agencies and professional groups and reviews the disaster situations from time to time. There are also governmental standing orders for disasters that specify the roles and responsibilities of all relevant ministries, departments and corporations, the Armed Services, and the District, Thana and Union-level administration in relation to disaster prevention/mitigation, preparedness, response and recovery or rehabilitation. However, there is no comprehensive disaster management plan with central coordination.

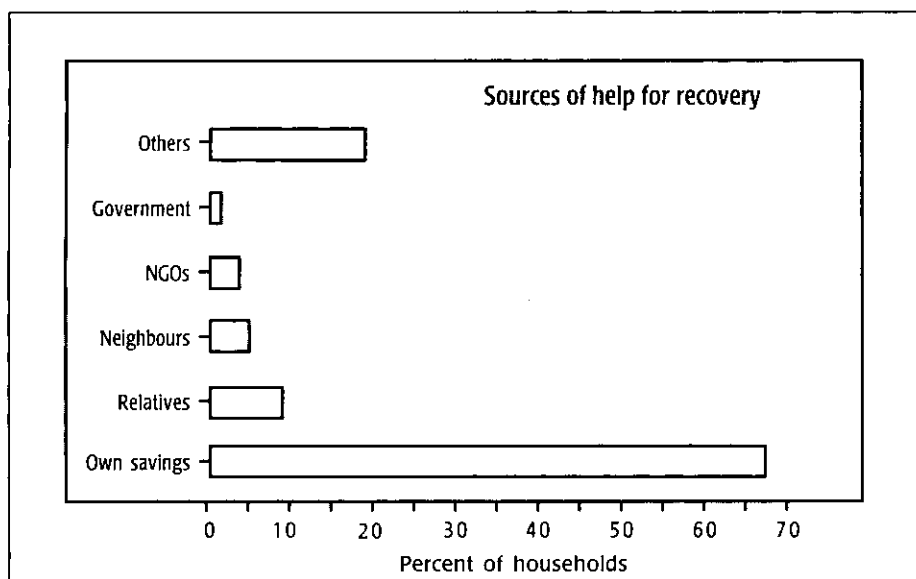


Figure 4: Percentage of households by sources of help for recovery

Extent of Recovery

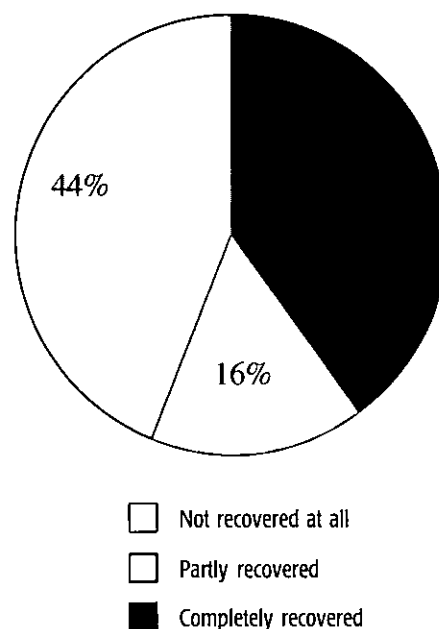


Figure 3: Distribution of households by extent of recovery

The necessity of a balanced approach
The Bangladesh Water Development Board has implemented quite a large number of flood control and drainage projects since 1960 and these projects provide flood protection to a significant proportion of the vulnerable area of the country. What is evident, however, is that such measures have not been able to reduce the extent of flood damage.

An analysis of flood damage statistics indicate that the extent of damage has increased along with an increase in the intensity of flooding during the last few decades (Jahan 1990). In 1954 about 55 percent of the whole country was affected by flood.

In 1974 the flood affected area as a proportion of the total area increased to about 58 percent. The devastating floods of 1988 and 1998 inundated nearly 70 percent of the whole country. Thus the proportion of the total area affected by floods has increased over the years despite the construction of thousands of kilometres of embankments that bring a substantial portion of the country under flood protection measures.

This, however, does not necessarily diminish the importance of structural measures; rather it points to the necessity of combining structural and non-structural measures in a way that minimises loss and achieves the best results. Special attention, therefore should be given to non-structural measure with an emphasis on floodplain regulation, flood forecasting and warning, evacuation of people from danger areas, flood fighting, public health

measures, emergency relief and recovery/rehabilitation.

The need for South-Asian cooperation

The main cause of flood in Bangladesh, as we know, is rainfall in the catchment areas of the major rivers of Bangladesh, namely, the Ganges, the Brahmaputra and the Meghna. Of the approximately 1.55 million square kilometres of drainage area of these rivers, about 93 percent lies outside Bangladesh, that is, in India, Nepal, Bhutan and Tibet (China).

Thus, though there may not be much rainfall locally, there may be heavy rainfall in the catchment area causing flood. Heavy rainfall in Bangladesh, however, would worsen the situation. In addition to heavy rainfall, melting snow, earthquake, deforestation and other human intervention with the natural environment in the upper catchment areas may also aggravate the flood situation in Bangladesh.

The very geographic location and physical setting of this flat alluvial country through which two of the largest rivers in the world drain into the Bay of Bengal, gives the flood problem of Bangladesh a multinational dimension. During the 1988 and 1998 floods we saw that about 80 to 90 percent of the total water that inundated Bangladesh came from across the borders because rainfall within the country did not surpass the normal limits for the period.

Thus, without the cooperation of its neighbours, particularly India, Nepal and Bhutan, Bangladesh cannot hope to manage its flood disasters.

The need for such cooperation was also emphasised before by water resources experts (Abbas, 1989; Hossain, 1989) who called for effective programs to:

- harness the water resources of the Ganges, The Brahmaputra and the Meghna basins for optimal economic use and for benefit to the peoples of this region
- promote a joint action plan by all co-basin countries to develop and manage water flow to mitigate floods
- undertake coordinated action for watershed management including checking deforestation, programming afforestation and construction of flood control reservoirs.

There is now a greater need for regional cooperation for a long lasting solution. Immediate steps, therefore, should be taken in this direction.

An important area where immediate action can start is the development of a cooperative network in the field of flood

forecasting and early warning.

In this age, both earth observation (EO) and telecommunications technologies are mature enough to help in the assessment and forewarning of a range of environmental risks and hazards whether man-made or natural. Such technologies may be particularly useful in combining satellite-derived and ground information for accurate forecasting of natural hazards.

In the case of flood, it is not just important to be able to monitor its evolution with EO technology. Information about land use, soil moisture, snow coverage in parts of the catchment area, weather forecast etc is also needed. All of these can be integrated in a GIS based disaster management system, to be able to model and forecast flood evolution and flood peaks in different locations. A cooperative network would be particularly useful for collection and sharing of real-time data to give the right input for modeling.

Conclusion

Floods in Bangladesh have important social dimensions. Poorer sections of society bear the brunt of the hazard and suffer heavily due to loss of employment, housing and property. Since poverty or low income is a major determinant of flood damage, improvement in income and living conditions would greatly reduce vulnerability.

As regards the flood control measures, the general view is that total flood control in Bangladesh is not possible. Bangladesh is an active delta where the entire land masses arose from flood-borne sediments.

Land formation is still taking place along the coastline as well as inland. Any structural solution to the flood problem based on the construction of massive embankments must be studied carefully since the consequences of tampering with the natural and dynamic process of land formation in Bangladesh is not yet known. In such a situation non-structural measures deserve special attention because of the advantages these have in terms of compatibility with the natural environment and acceptability by the people.

The South-Asian region, with three of the largest river system in the world, confronts serious problems due to the regular onslaught of devastating floods. Bangladesh, being the lower riparian of all the three river basins, is at a great disadvantage as it gives passage to the entire flood flow.

The individual efforts of a country in facing the challenge is not enough. There is, therefore, an urgent need for regional cooperation to develop a long-lasting solution to the flood problem.

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About the Author

Sarwar Jahan is a professor of Urban and Regional Planning at the Bangladesh University of Engineering and Technology (BUET), Dhaka. He did his MURP degree from BUET and MA degree in regional planning from Waterloo, Canada. He obtained his Ph.D. degree from the University of Illinois at Urbana-Champaign, USA. His research interests include disaster management, spatial modelling and urban and regional analysis. He published papers relating to these fields in the Journals and Proceedings in Bangladesh, India, USA, UK and Japan. This paper is based on the study "Socio-Economic Impacts of the 1998 Flood in Dhaka City". The author gratefully acknowledges the financial assistance provided by the Centre for Advanced Study and Research, BUET for carrying out the study.

Planning for the unthinkable: psychosocial reaction to Chemical and Biological Warfare (CBW) weapons

From unthinkable to reality

The ongoing efforts by dictators and totalitarian regimes to acquire Weapons of Mass Destruction (WMD), especially Chemical and Biological Warfare (CBW) weapons, has focused worldwide apprehension on their possible use in future conflicts (Alibek & Handelman 1999, McGeorge 1990). An even worse nightmare almost materialised when the Japanese terror group, Aum Shinrikyo, twice used Sarin nerve gas against civilian targets and was found to be experimenting with biological weapons in their laboratories (Aum Shinrikyo 1995). Although the danger of global nuclear war has decreased, the possible use of WMD, without warning against unprotected civilians, has emerged as a realistic threat as the new century begins.

Since the potential impact of CBW weapons on unprotected populations can be devastating, their footprints obscure and their cost low, these appear to be attractive future weapons of choice for terrorists bent on causing mayhem (Betts 1998, Simon 1997). BW weapons in particular are of grave concern. They are the easiest and cheapest to produce and deliver, the hardest to detect and trace, and the most complex to mitigate against (Steinbruner 1997-8). Once introduced, the potential capacity of biological agents to reproduce and adapt upon release could, at least theoretically, spread their effect far beyond the initial target site (Fischer 1999). A 1993 study revealed the awesome dimensions of BW weapons: a single plane spraying 100 kilograms of anthrax spores over Washington, DC could, under suitable conditions, kill between one and three million people (US Congress, Office of Technical Assessment, 1993).

These concerns have already generated papers, documents and training manuals, some of which are cited here, looking at the problem from many perspectives. Planning for this unprecedented threat has become a necessity for those authorities that do not want to be caught unprepared.

Historically, experimentation with CBW began with an eye to development

by Professor Hayim Granot,
Mass Emergencies Project, School of
Social Work, Bar-Ilan University,
Ramat Gan Israel

of battlefield weaponry. Therefore, the implications of non-conventional weaponry for combatants have been given most attention. Their unpredictable nature has thus far curtailed the battlefield usefulness of CBW weapons but this could change in the future. Their potential as terror weapons turned against civilians is a fairly recent development (Christopher, Cieslak, Pavlin & Eitzen 1997). The shortcomings of CBW in combat do not have the same significance when used against civilians. Furthermore, psychosocial impact is a prime goal of terrorism. This aspect of CBW weapons is potentially extensive, but has only been partially explored in published work to date, since not many behavioral and social scientists have the background, resources or inclination to explore these possibilities. This paper addresses the psychosocial impact of CBW weapons on civilian populations and the emergency procedures such assault would necessitate.

Consequence management

Containing the results of CBW weapons depends on the quick identification of the specific agent or agents used. Early and accurate diagnosis, however, is bound to be problematic, since the first symptoms for many of these agents are fairly generalised and could initially elude detection. Furthermore, few doctors in developed countries have experience with the symptoms likely to appear. Simon (1997) points out that, 'since BW agents are invisible, odorless, and tasteless, no one would know that a terrorist attack is under way'. Unless prior intelligence is available, 'an increased number of patients presenting with signs and symptoms caused by the disseminated disease agent is the most likely first indicator that a BW attack has occurred'. Much the same could be said about today's CW weapons.

Although much effort is now being invested in its improvement, the current

stage of development makes laboratory detection of specific chemical or biological agents difficult and time-consuming. Automated monitoring of the environment by sensors, an expensive but hopeful solution, is still far off and will depend on a decision to install and activate such sophisticated equipment at the right time and location. For the present only the simultaneous appearance of numerous cases in fairly advanced stages would indicate the true nature of an unexpected assault.

In crowded urban surroundings, the general differences between the effects of chemical and biological agents could be significant for containment and consequence management. It is possible that these differences might imply differences in psychosocial impact as well.

Theoretical differences

In theory, at least two objective differences between the characteristics of chemical and biological weapons could affect the way we cope with them and their psychosocial impact. Chemical agents, generally speaking, are faster acting than biological agents. The presence of nerve gas, otherwise imperceptible to the senses, is immediately recognisable by its dramatic and deadly effect on those exposed. Nerve agent victims would immediately die or exhibit ill effects. Casualties with lesser degrees of exposure might experience ill effects in minutes or hours.

BW victims might not experience symptoms for hours, days or maybe even weeks, ultimately falling ill anywhere, even far from the area attacked. By then, after incubating unnoticed in their systems, it might be too late to prevent the full virulence of the disease. It may even be difficult to determine exactly when and where the assault took place. As already indicated, response agencies may not become aware of deliberate exposure for some time, if ever (Simon 1997).

Secondly, persons exposed to chemical attacks themselves constitute a hazard to those who must cope with casualties. It would be necessary to restrict the movements of victims after attack to prevent the spread of poisonous residue

to others. This requires first responders and emergency medical personnel to exercise extreme caution in the rescue and care of victims. Elaborate decontamination and screening procedures will inevitably slow the process and be detrimental to the condition of the casualties. The precautions are also likely to produce profound emotional reactions in both rescuers and victims.

Some authorities suggest that to forestall accidental epidemics during preparation, the weaponised biological agents most likely to be used would probably not cause contagion. If this were true, their victims would not pose a hazard to responders. Unfortunately, terrorists are not particularly distinguished by their caution. They are unlikely to consider such factors.

Considering the overall problems of detecting the existence of a terror attack and determining what specific agent was employed, the distinction between chemical and biological threats does not seem to be of great practical significance to first responders. In both situations, their physical management involves unprecedented hardships. Although decontamination procedures would vary with the specific agent, responders would have to exercise similar caution in any event. The psychosocial effects of both types of terror weapon are also likely to make their management extremely difficult for all involved.

Responder precautions

Rushing to the rescue is no longer advisable. First responders can never be sure about the nature of the hazards they face when called to an incident, particularly a terror incident. Terror assaults, even with explosives, may involve a deliberate attempt to injure responders and hamper rescue efforts. Emergency agencies are beginning to plan for greater caution in their on-site response. Adding the difficulty in ascertaining the identity of the agent involved in CBW, this means emergency responders must prepare for all eventualities.

Response personnel are being trained to relate to all incidents as though they threaten responders, until proven otherwise. In sophisticated consequence management training, awareness of the CBW threat evokes similar cautions in all cases. In the US, for example, all incidents are considered potential *B-NICE* (Biological; Nuclear; Incendiary; Chemical; or Explosive) events, necessitating similar precautions to reduce *TRACEM* (Thermal, Radiological, Asphyxiation, Chemical, Etiological [disease carrying], and

Mechanical) risks to responders (Emergency response to terror 1997).

Any possible terror incident must be approached with exceeding caution. Thus response personnel are being taught to minimise their exposure time, keep their distance, make use of shielding and decontaminate victims and themselves as soon as feasible. While these are certainly justified precautions in light of the growing hazards, they have profound implications for the tradition of speed and unconstrained nature of rescue operations.

Psychosocial impact

Few papers consider the psychological and social implications of the use of these weapons on civilians. It is possible that they are so overwhelming that they repel most qualified researchers. In any event, these implications are likely to be substantial, both for the exposed population and for their rescuers and certainly warrant greater attention.

Impact on rescuers

Rushing into a disaster area and working long hours in a desperate rescue effort is the tradition of Search and Rescue (SAR) teams around the world. Working under CBW circumstances requires protective gear (masks, self-contained breathing apparatus and NBC suits) that is cumbersome, and isolating. Both verbal and non-verbal communication between rescuers and victims and among rescuers themselves is likely to be disrupted, compounding physical hardships with emotional difficulties. Brooks, Ebner, Xenakis and Balson (1983) reported considerable psychological and behavioral difficulty among participants just from donning protective gear in experimental chemical warfare training exercises. In the best of circumstances, some individuals will find such conditions unbearable for even the shortest period of time. In warm weather, wearing protective gear quickly becomes oppressive to everyone. As a result, work periods would have to be drastically reduced. Under these conditions rescuers are capable of working only minutes, not hours.

Changing public reaction

A further change likely to take place is the reaction of the public to emergencies. One of the little discussed, but widespread characteristics of the immediate response phase to sudden emergencies and disasters, is a tendency toward mutual aid and cooperation among the victims and even members of the general public (Drabek 1986). Because response agencies are so

focused on their own vital activities, they often overlook the importance of these efforts in saving lives in the immediate aftermath of disaster. Even though official rescue remained in the limelight, media coverage of the catastrophic August 1999 earthquakes in Turkey, Greece and Taiwan revealed the extent of these efforts. It is not unusual for spontaneous responses to account for the majority of those saved in sudden emergencies.

The threat posed by CBW will in all likelihood inhibit, if not eliminate, such voluntary rescue attempts. While reducing exposure, this would substantially increase the burdens of official emergency responders at the very time they themselves are being forced to act with greater caution. Furthermore, if inadequate resources are available for the numbers injured, competition for care could eliminate all co-operation.

Medical system strain

Prevention and prophylaxis, common public health activities, are essentially inapplicable in an unexpected CBW terror assault. All that remains for the medical system is to care for the casualties in the wake of the incident. This includes diagnosis, management, and triage of casualties, while preventing the spread of the agent and protecting themselves from exposure to the same risks.

The sudden death and illness of large numbers of victims and the possible need to contain ill-effects among others who do not at once exhibit symptoms, while exercising extreme caution, would challenge, if not overwhelm, the medical resources of even the best prepared society. The toll that might be extracted from medical service personnel working long hours against hopeless odds under severely threatening conditions is uncertain. Over and above the necessity to cope with the large-scale health emergency, the ensuing psychosocial problems could easily prove unmanageable.

Emotional and social impact on victim management

The potential emotional and social implications of civilian victim management requirements in CBW assaults are most complex. Being unprecedented, however, even the experts on human response to extreme situations are uncertain about this impact.

Exposure to World War I tactical use of gas, mostly chlorine and mustard gas, had a well-documented physical and psychological impact on soldiers, immediately and in the long-term. Large numbers of ex-servicemen suffered the chronic after-

effects for years following the end of hostilities. No follow-up of the Egyptian victims of more recent Mustard gas use in the Yemen was ever conducted. Few cases of exposure to the more sophisticated nerve agents have been studied and the emotional impact of the infamous Iraqi use of nerve gas against their Kurdish population or against Iranian troops was impossible to investigate.

Fullerton and Ursano (1990) surveyed the few documented accidental or experimental instances involving nerve agents. Judging from these few incidents, large numbers of individuals are likely to experience psychosomatic symptoms difficult to distinguish from actual contamination because of their similarity to the early stages after exposure. In the Japanese incidents, these were many times the numbers of actual victims (Aum Shinrikyo 1995).

Large-scale emergency medical procedures must include management of the numerous pseudo-victims (Holloway et al. 1997). To reduce pressure on medical facilities, these must quickly be sorted out from those really exposed. The use of placebos has been suggested as part of any Psych-Ops program aimed at this phenomenon. If not properly managed, emotional victims could return to choke the medical care system when they find that initial medical attention did not relieve their symptoms.

The impalpable nature of chemical and biological agents intensifies their frightening emotional impact. Logistic problems, such as inadequate detoxification resources or lack of antitoxins, could further intensify reactions. Appropriate measures must be taken before anyone exposed to these agents can be released into the community. Decontamination of those exposed to a chemical assault involves the showering of victims and careful disposal of their clothing (Rosenbaum 1993). The dehumanising nature of these countermeasures will likely intensify the emotional hardship for many survivors as will restricting the mobility of victims after attack. The oppressive nature of decontamination is bound to contribute to heightened anxiety.

Extrapolating from non-CBW incidents, some authorities believe that fear may be so intense in CBW attack, that widespread hysteria and panic could cause exposed and even unexposed populations to become unruly or unmanageable. The Psych-Ops dimension of the problem would seem to be all but overwhelming.

Fullerton & Ursano (1990) summarized the few studies available at the start of the

decade on response to CBW. They primarily address the military implications of findings from incidents involving the accidental and experimental exposure to organophosphates, not biological agents. Their conclusions are still worth quoting here:

1. Working around nerve agents does not necessarily produce panic.
2. If a group exposure occurs, angry responses to command can be anticipated.
3. Behavioral and psychological responses to nerve agents can be of a subtle nature, including disturbances in memory, impaired concentration, irritability, and confusion.
4. Exposure to nerve agents can lead to the appearance of subtle problem-solving crutches.
5. Exposure to nerve agents has long-term effects, documented up to one year.
6. Because behavioral and psychological effects persist for a varying length of time (two weeks to one year) when to return individuals to their units after exposure to nerve agents is unclear.
7. Multiple exposures increase the risk of symptomology.
8. Further data is needed on dosages that produce significant cognitive and affective disturbances when given as chronic low-dose exposures.
9. The use of alcohol is of substantial concern in the CB environment.
10. Group contagion of behavior will appear and can adversely affect functioning in the CB warfare environment.
11. Complaints similar to the symptoms of contamination can be anticipated from those who think they have been exposed even when contamination has not occurred.
12. Over-dedication to the mission may make it difficult for an individual or supervisor to accurately assess the physical limitations of an individual.
13. Overall, the CB warfare combat environment itself seems to contribute 5% to 20% to casualty rates.

These conclusions have immediate relevancy to rescue forces but their implications may apply to casualties as well. There is much to suggest that those exposed to less than lethal doses are likely to suffer at least temporary physiological damage detrimental to reasoning processes and motor skills.

They appear to be subject to the suggestive behavior of others and could therefore exhibit difficult to manage collective behavior. Just being exposed to the non-conventional environment

seems to affect a substantial minority of those so exposed.

Public response

Few researchers have sought to analyse the likely psychological and social implications of a BW attack, which threatens to overwhelm health facilities and leaves emergency response with very partial solutions at best. Holloway et al. (1997) in one of the few recent papers to address these issues in detail, predict antisocial behavior.

One must distinguish between personal anxiety and even panic, leading to the prevalence of psychosomatic symptomology and outbursts of aggressive antisocial crowd behavior. Although the possibility of such behavior is anticipated by Fullerton and Ursano (1990), it is only conceivable during efforts to escape or when faced with a shortage of life-saving supplies. This offers scant comfort when restricted movement of exposed populations and overwhelmed medical facilities are contemplated.

Dire speculation

Are unmanageable panic and mass hysteria a foregone conclusion? In the past, there was a tendency to exaggerate antisocial behavior in the wake of disaster (Granot 1993). It was originally believed that to escape danger or acquire the scarce means required for survival, humans become aggressive and irrational, self-centered savages, ready to save themselves at the expense of those around them. Careful rereading of disaster records and the eyewitness reports of survivors show that such behavior has actually tended to be rare.

Social values seem far more ingrained than was formerly believed. Even in catastrophe, many examples of mutual aid and help extended to the weak can be cited. Even escape from burning buildings now seems less likely to produce panic than was formerly thought (Sime 1990). Most instances of panic flight from burning buildings are today believed to be rational attempts to escape immediate danger that went wrong.

Examining the literature on catastrophic emergencies and disasters such as natural disasters, aerial bombing in WWII, Hiroshima, Nagasaki, Chernobyl or Bhopal, one rarely find riots, uncontrolled collective behavior, or other dire immediate crowd reactions among survivors. Media coverage of the catastrophic 1999 earthquake in Turkey made it patently clear that even in the face of desperation, fear, grief, deep resentment and anger at government officials and

building contractors, almost no instances of mob aggression were recorded.

It is unlikely that aggression has been systematically omitted or overlooked in recording these events. The researcher looking for clues regarding what to expect in the wake of CBW weapons can only reach a number of alternative conclusions. It may be that the anticipated anti-social reactions do not materialise or that their impact on the overall picture is minor. They may occur in selected cultures only.

On the other hand, one might hypothesise that CBW weapons have a more severe emotional impact than other threats because of they are unfamiliar, invisible and undetectable to our senses. Additionally, the physiological damage caused by these agents could directly affect judgment and behavior.:

No matter how logical it seems that victims denied access to medical care would be hysterical, rebellious or unmanageable, dire predictions regarding the psychological or social impact of these weapons could prove to be wrong. At this point we still seem to be speculating in this regard.

Conclusions

Acquisition of CBW capacity by rogue states and ungovernable terrorists is a justifiable cause for alarm in those circles responsible for the safety and security of civilian populations. These weapons are capable of inflicting heavy losses on unsuspecting civilians.

Since the subject is recent and no massive attack on civilians has ever been monitored, all of the attempts to plan for such a contingency remain speculative. Among the few detailed papers seeking to describe the psychological and social impact of such an attack there is a tendency to expect severe anti-social behavior and a breakdown of public order. There is little evidence from history to support such dire predictions even in the worst case scenarios. We would have to conclude that this hazard differs from other disasters or causes, either in the intensity of the dread it arouses or in causing organic damage likely to affect behavior, to accept such unusual predictions.

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Conference announcement



Global Disaster Information Network (GDIN) Conference 2001

Canberra, Australia
March 20-23, 2001

EMA will host the fourth Global Disaster Information Network (GDIN) Conference at the 'Rydges Canberra' hotel from 20-23 March 2001.

Working Group discussions will be held on 20 March 2001 with the Conference proper commencing on 21 March 2001.

A conference webpage is currently under construction and can be found at either the GDIN website www.gdin-international.org/home.html or the EMA website www.ema.gov.au

For further information contact:

Lyn van Kampen
phone: 02 6266 5317
email: gdin@ema.gov.au

Jonathan Abrahams
phone: 02 6266 5219
email: gdin@ema.gov.au

Patricia Tart (Conference Organiser)
Australian Convention and Travel Services
email: gdin@ausconvservices.com.au

Disaster mitigation: Challenges to raise the capacity of at-risk populations in coping with natural, social and economic disasters

The role of the Red Cross and Red Crescent

In every culture and as far back as history records, the tragedy of natural and manmade disasters are embedded in our history. Humanitarian organisations share a similar goal at times of relative tranquility—to help the developing worlds' poor in their efforts to achieve social and economic well being. Many organisations subscribe to long-term assistance that support processes to create competence and become self-sustaining over time. Some organisations strive to reach new standards of excellence in offering disaster relief, technical assistance, training, food aid and material resources and management in combinations appropriate to local needs and priorities. And some organisations also advocate public policies and programs that support these needs.

The readiness to predict and, where possible, prevent disasters, reduce their impact as well as respond to and cope with their consequences at international, national and local levels, is central to the work of the International Federation of Red Cross and Red Crescent Societies and National Societies around the world. This task essentially involves:

- reducing the vulnerability of households and communities in disaster-prone areas and improving their ability to cope with the effects of disasters
- strengthening the capacities of National Societies in disaster preparedness and post-disaster response
- determining a National Society's role and mandate in national disaster plans and
- establishing regional networks of National Societies that will strengthen the Federation's collective impact in disaster preparedness and response at the international level.

The International Federation of the Red Cross and Red Crescent Societies has developed a Policy for Disaster Preparedness that was adopted by 176 National Societies at the XII Session of the General

by Earl James Goodyear, Ph.D.,
International Federation of Red Cross
and Red Crescent Societies,
Geneva, Switzerland

Assembly in Geneva in November 1999. This policy applies to all types of disaster preparedness activities at local, national, regional and international levels, whether carried out by a single branch of a National Society, by an individual National Society or by the International Federation acting together. The policy includes the following points:

- Recognise that disaster preparedness should be one of the primary activities of the International Federation and each National Society, regarding it as the most effective way of reducing the impact of small and localised as well as large-scale disasters. The National Society has a role to play at branch, national and international levels. These roles shall be complemented by the actions of the Federation at the international level.
- Recognise disaster preparedness as an effective link between emergency response, rehabilitation and development programs and strive to build disaster preparedness upon the competent programming that exists in other key areas of Red Cross/Red Crescent work such as in the health sector.
- Recognise the Red Cross/Red Crescent role in disaster preparedness as complementary to government and thus will not replace state responsibilities. In addition, the National Society should engage in debate with government on the focus and nature of the National Emergency Plan and encourage the assignment of a clear role and responsibilities to the National Society, supported by appropriate legislation.
- Advocate, where necessary, with government, donors, non-governmental organisations and the public, the need for and effectiveness of disaster

preparedness. National Societies should contribute to raising awareness of hazards, levels of risks and coping mechanisms adopted by society and mitigation programs, such as early warning systems, that may reduce the loss of lives and property when a disaster strikes.

- Strengthen the organisational structures at international, national and local levels required for effective disaster preparedness. In particular, prioritise the strengthening of branches, the mobilisation and training of Red Cross/Red Crescent volunteers in high-risk areas, and the responsibility of National Societies to prepare to be part of the Federation's international disaster response program. Integrate or harmonise such activities with institutional development and other relevant program areas.
- Improve coordination by promoting better cooperation and partnerships between National Societies, ICRC, governments, non-governmental organisations and other disaster response agencies at local, national, regional and international levels.
- Identify those persons, communities and households most at risk to disaster through assessment and analysis of risks, vulnerabilities and capacities (Vulnerability and Capacity Assessment) as a basis for prioritising location and focus of programming activities.
- Raise awareness of disaster hazards through public education—encouraging vulnerable people to take preventative and mitigating actions where possible before disaster strikes. Ensure that the knowledge gained from prediction and early warning systems can be accessed, understood and acted upon by local communities.
- Improve the ability of vulnerable communities to cope with disasters through community-based disaster preparedness strategies that build on existing structures, practices, skills and

coping mechanisms. Recognising that a community-based approach is the best guarantee that improvement in disaster preparedness will be realised and sustained, the assisted population must participate in planning and preparation for disasters. All activities and programs should be sensitive to issues of gender, generation and the needs of vulnerable groups, such as the disabled.

- Strive to provide the financial, material and human resources required to carry out appropriate and sustainable disaster preparedness activities. In particular, maximise the strategic advantage of the International Federation to mobilise all available resources and establish regional networks of National Societies that will strengthen the Federation's collective impact in disaster preparedness.

For many years disaster preparedness had been viewed by the International Federation as focusing on activities that improved the emergency response capacities of National Societies at the time of a natural or manmade disaster. The International Federation, along with many other non-governmental organisations, perceives that the challenge for the next decade is to create more effective mitigation programs that enable people at risk to gain mastery of their own lives and overcome the vulnerabilities that inhibit social development. This challenge is to be addressed through greater participation of vulnerable groups in the decision-making process of developmental and risk reduction programs, along with communication strategies that effect behavioral changes in the decision-makers in government, development agencies and the donor community.

For the International Federation, we foresee a period of growing rather than lessening instability. The destabilising forces stem from a complex interplay between population growth, accelerating gaps and disparities caused by globalisation, environmental stress and pollution with worsening competition for natural resources, a differential access to technology, reduction in and privatisation of government's social welfare responsibilities, an erosion of the value of community, and a further destabilising of sub-national groups and interests.

The need for a paradigm shift

Between 1995 and 2010, the number of people living in absolute poverty is expected to grow from 1.3 to 1.8 billion people. Between 1995 and the year 2000

the number of people living in this poverty category will grow from 24 to 33 percent. Instability and armed conflict will continue to rise in the world, generating even more human displacement (40 million people displaced in 1995). There is growing concern about the way in which poor people adapt coping strategies to address short-term shocks and longer-term changes in their lives.

In the 1980's and 1990's organisations began shifting their development thinking away from externally imposed blueprint solutions. Now, a more iterative approach is applied between the organisational prescriptions and the at-risk populations' developmental capacities. This shift indicates recognition, and some understanding, of the ways in which people at risk manage and change their own lives in response to stresses and opportunities. It implies an approach to development that builds upon raising capacities and enables people to avoid or find alternatives to some of the deleterious effects of human crisis.

This paradigm shift is reflected in the notion of contributing to longer-term environmental and economic sustainability and to creating stronger linkages between relief and development initiatives. An important factor in this paradigm shift is how to reinforce the capacity of at-risk groups to adapt in times of rapid or slow onset shocks to their lives. This adaptation process, by choice of the at-risk group, requires a dynamic that either enhances existing security and wealth or reduces vulnerability and poverty. And, requires more adherence by non-governmental agencies with the importance of gender, ethnicity, family and community structure along with the socio-economic references affecting adaptation strategies.

Mohan Munasinghe, (1998) Senior Advisor, World Bank suggests that proximity to an extreme natural event combines with low economic or social status to result in deadly consequences. By the year 2025, 80% of the world's population will reside in developing countries and estimates that up to 60% of residents are highly vulnerable to floods, severe storms and earthquakes (First International Earthquakes and Megacities Workshop, 1997). And, it is highly conceivable that more unsolved tensions will erupt into civil conflicts that force civilian populations to flee their homes and countries and swell the ever increasing population of displaced persons and refugees.

As affirmed in the Yokohama Strategy and Plan of Action for a Safer World, disaster prevention, mitigation,

preparedness and relief are four elements that contribute to, and gain from, the implementation of sustainable development policies. These elements, along with environmental protection and sustainable development are closely interrelated. Community involvement and active participation should be encouraged in order to gain greater insight into the individual and collective perception of development and risk, and to have a clear understanding of the cultural and organisational characteristics of each society as well as its behavior and interactions with the physical and natural environment. This knowledge is of the utmost importance to determine those factors, which favor and hinder prevention and mitigation or encourage or limit the preservation of the environment for future generations.

The International Federation has elected to address future disaster preparedness activities through striking a balance between mitigating negative, destabilising forces and building and reinforcing positive trends. Mary B. Anderson (1990) questions, which costs more: prevention or recovery? she states that the basic argument for integrating disaster awareness into development planning is that it is wasteful not to do so.

What choices do organisations working in disaster prone developing countries face as they adopt programs for economic and social development and prepare for the eventual losses and human suffering from natural and manmade disasters? How does an organisation factor into its planning process the human effects of conflict over resources, ethnic recognition and ideologies and suffering caused by natural disasters? One approach used by the International Federation is through greater attention to counter the effects of risk through disaster mitigation.

The following case study of the Palang Merah Indonesia (Indonesia Red Cross Society) describes its approach to mitigate the effects of a recent socio-economic and political crisis affecting its citizens.

Responding to socio-economic and political crises: a case study of the Palang Merah Indonesia

The socio-economic and political events that have affected communities throughout the Indonesian archipelago over the past two years have resulted in massive unemployment, a weakened currency and inflation rates that have destabilised local markets. These conditions have contributed to an overloading of public facilities for health care, education and other social services in addition to increasing the

number of vulnerable families due to a nutritionally inadequate diet.

The Palang Merah Indonesia (Indonesian Red Cross) was on hand to provide first aid and medical care during demonstrations and civil riots linked to the socio-economic and political events. The Surakarta Branch responded to immediate needs of the vulnerable by offering basic food commodities at affordable prices, providing clothing and making available blood and blood products from its Blood Transfusion Center free of cost to the poorest among the poor.

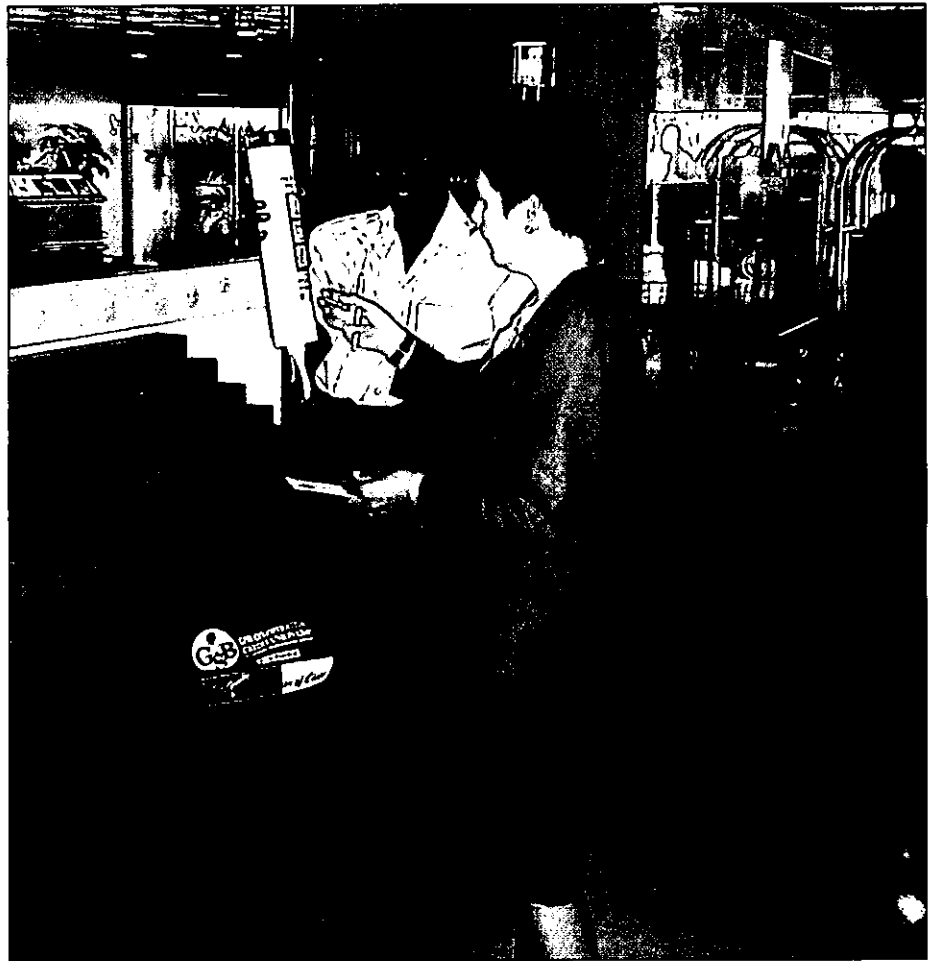
In response to this crisis, the PMI developed the Socio Economic Crisis Program involving 12 chapters and 52 branches and the PMI Hospital in Bogor, West Java to support three components:

1. food assistance (rice) for a period of 12 months to 660,000 people comprising 120,000 female-headed households or 580,000 people, 65,000 elderly over the age of 60 years, 15,000 orphans and/or the handicapped
2. medical assistance to 400,000 beneficiaries to include free consultation and free local generic medicines to a maximum of Rupiahs 20,000 per individual
3. blood and blood products assistance to 25,000 patients

While the Indonesian Red Cross initiative was strictly relief oriented, it was successful in alleviating a slide into acute deprivation for program recipients, until their economic situation either returned to normal or other social safety nets could be offered by Government or other civil society organisations. The PMI demonstrated an effective decentralised strategy that worked with hundreds of enthusiastic staff and dedicated volunteers in addition to coordination with World Food Program and BULOG (the Governmental Logistics Agency) and the Kimia Farma (the Government's Drug Agency).

Working with local communities

The vulnerability of the people in the Caribbean increases every year as a result of high population growth and an ever increasing rural to urban migration pattern. The Caribbean faces other challenges to raise the capacity of vulnerable populations to respond effectively to local hazards, as 40% of its population is now under the age of 20 years and national economies have a limited capacity to support the recovery of its citizens after a national disaster. The Regional Delegation of the Federation in the Caribbean, covering 16 National Societies from Cuba in the north to



Above: Red Cross staff demonstrating new safety materials to staff of Hotel Pegasus, Jamaica

Surinam in the south and from Barbados in the east to Belize in the west, initiated a Disaster Preparedness Program in 1996 to assist vulnerable groups to develop stronger coping capacities to various natural and manmade hazards.

Hurricanes pose a permanent threat to the Caribbean and, when mixed with economic under development in the region, accentuate the extent of losses liable from natural disasters. Other hazards in the region include geological risks from volcano, earthquakes and landslides, hydrometeorological hazards from flooding and social and technological hazards such as HIV, chemical spills and industrial and road accidents.

The Red Cross in the Caribbean has begun to address the vulnerabilities of a growing number of their population in a two-prong approach as described below:

Community-based disaster preparedness training project—a case study of the Caribbean Red Cross Societies

The broad objective of this program launched by Red Cross Societies in the Caribbean was to improve community capacity to cope with disasters and to minimise their effects on the most vulnerable populations. This objective was initiated through a systematic intro-

duction of the Community Based Disaster Preparedness program into the headquarters and branch level of National Societies of the region and to other grassroots organisations. With trained staff and volunteers, National Societies and other grassroots organisations could address their attention to vulnerable communities that matched the description as, 'those of greatest risk from situations that threaten their survival or their capacity to live with a minimum of social and economic security and human dignity.'

The program has been successful in raising the capacity of National Societies in the region to prepare and manage disaster preparedness and response plans and develop a greater interaction between National Societies and communities in developing sustainable risk reduction interventions. The Red Cross has developed a comprehensive disaster management manual and training modules for the region in addition to developing a pool of trained resource persons to facilitate community-based disaster preparedness courses.

A variety of new Red Cross programs targeting at-risk populations have been developed in combination with local groups as a result of this regional strategy.



Above: Embankments are part of a pro-active flood preparedness strategy in Bangladesh.



Above: a cyclone shelter in Bangladesh that has protected the lives of hundreds of vulnerable rural people living along the coastal Bay of Bengal.

The International Federation in a joint initiative with the Jamaica Red Cross, Royal and Sun Alliance and the Jamaica Hotel and Tourist Association is developing a disaster and safety management program to address the unique needs of hotels in the region. This innovative program enables the National Society to raise awareness of disaster preparedness methods with hotel industry staff, and to generate resources from the provision of services to support the funding needs of the Red Cross.

For the Federation and National Societies, the development of national capacities is an important process to better

serve the needs of the most vulnerable. With a long history of development in disaster response, National Societies are acutely aware that greater attention has to be paid to preventive strategies aimed at saving lives and protecting resources and assets before they are lost. In essence, this task will include the continuous collection and analysis of relevant information and activities such as:

- predictable hazards—identification and mapping of key hazards
- assessing the geographical distribution of threats—geographical areas vulnerable to seasonal threats
- who and what are the most vulnerable

to threats—households, groups and communities at greatest risk

- assessing the most vulnerable groups' capacity to respond to threats/disasters—strengths and coping mechanisms to local hazards
- determining the other players in disaster preparedness and response—development of a network to support a comprehensive program
- assessing the capacity of National Societies to mitigate and respond to disaster threats—on-going capacity assessment of both response at the time of national or local disasters and initiation of interventions to mitigate the consequences of such disasters for people at-risk
- define gaps in national/local preparedness plans—advocate to policy makers to ensure plans have been developed to reduce the impact of disaster episodes on vulnerable communities

National Societies in disaster-prone nations

The Bangladesh Red Crescent Society, with a long history of initiatives dating back to 1920, provides a clear example of a National Society that has begun to balance disaster preparedness activities between maintaining a strong response capacity and defining and initiating successful mitigation initiatives. With an average annual death toll of 44,000 attributed to disasters from 1987 to 1996, Bangladesh is one of the most disaster prone nations in the world. To add to its vulnerabilities, Bangladesh is confronted

by social unrest in its neighboring countries, while internally it has to address poverty alleviation as its first national development objective.

Focus on response preparedness—a case study of the Bangladesh Red Crescent Society

Given the predictable disasters likely to strike the 130 million people of Bangladesh and the fragile livelihood of its population, the Bangladesh Red Crescent society (BDRCS) has focused its activities in disaster response on providing food, medical services and other aid to people affected by disaster episodes. Curative health care is offered through nine hospitals and health clinics, 62 maternal child health centers and two blood centers. The BDRCS development priorities are to:

- strengthen the overall organisation—the National Headquarters and the local Branch network, and its management, staff and volunteers—in order to achieve the characteristics of a well functioning National Society
- increase protection and assistance to the most vulnerable people through appropriate response and disaster preparedness measures
- improve health and blood services, promote socio-economic development in the weakest sections of society and improve tracing services

Within its latest five-year Plan of Action, the BDRCS is seeking to modernise its governance functions, decentralise decision-making processes, introduce a new financial management system, develop human resources, and strengthen the capacities of both departments and branches. Institutional development and disaster preparedness is essential, given the dimensions of the activities of its 68 branches that serve populations varying from three hundred thousand in the hill tracts to ten million in the capital of Dhaka.

In their Community Based Disaster Preparedness Program the BDRCS seeks to develop, within each branch, a District Emergency Plan that targets vulnerable communities affected by flooding, tornadoes, river erosion, drought and cyclone. Community activities in first aid, awareness raising on risk reduction and improved coping mechanisms, disaster early warning, and support to raise the level of health through construction of tube-wells and latrines, are some of the activities initiated by the branches.

The Cyclone Preparedness Program, partially funded by the Government of Bangladesh, seeks to increase the effec-

tiveness of its 33,000 volunteers and their capacity to advocate for greater community awareness of cyclone preparedness, improve the dissemination of warning signals to vulnerable communities along the coastal belt, assist communities in evacuating to shelters and provision of first aid and relief. The CPP also operates the largest radio communications systems offering a reliable means of communications for the entire coastal belt in both pre- and post-cyclone conditions.

Focus on coastal environmental preservation—a case study of the Vietnam Red Cross

The Environmental Preservation Project, undertaken by the Thai Binh Red Cross branch of the Vietnam Red Cross, elected to undertake this mitigation program to address two issues affecting people living along the sea coast in the Thai Thuy district of Thai Binh province. With eight to ten typhoon storms striking the coast of Vietnam annually, tidal flooding often breaches sea dykes causing economic losses to the local population engaged in aquaculture.

The planting of mangrove plantations served two important purposes:

- to act as a buffer zone in front of the sea dyke system to reduce the water velocity, wave strength and wind energy to protect coastal land, human life and assets invested in development, and
- to contribute to the production of valuable export products like shrimp and crabs, high value marine fish species in cages, mollusk farming and seaweed culture for agar and alginate extraction.

By contributing to environmental support to coastal fisheries and aqua-

culture through the development of 2,000 hectares of mangroves, The Thai Binh Red Cross also helped to provide a livelihood benefit to the vulnerable population through new employment opportunities for their labor.

An evaluation of the project in 1996 indicated that: 'By helping to protect the sea dykes, the mangroves are contributing to the economic stability of the communes. All members of the community stand to benefit as their homes, livestock and agricultural land are better protected from the risk of flooding. Poor families, with little money to repair or replace material losses from storm damage, are the greatest potential beneficiaries.' The project area was struck by the worst typhoon in a decade two months prior to the project evaluation. Lack of any significant damage to the sea dyke and aquaculture pond systems in Thai Thuy provided the best possible indicator of the effectiveness of the mangroves.

And, the perception of the local population is that the mangroves planted will:

- lesson storm, flood protection of sea dykes and ponds
- protect property and the coastal inhabitants
- improve aquatic production and the environment
- prevent saline intrusion into agricultural land
- expand the land area for the national benefit of Vietnam

Regional disaster preparedness programs

In addition to activities initiated by individual National Societies, the 13 Regional Delegations located around the world contribute to strategic programming undertaken by the National Societies



Above: In this Red Cross cyclone shelter in India, residents of the community use the shelters for multiple purposes during non-emergency periods.

in their respective regions. The International Federation Regional Delegation for Eastern Africa in Nairobi has been supporting disaster preparedness since 1993 when staff began to offer technical advice and support relief operations in Uganda and Kenya. The program continued to develop standardised procedures and preparedness initiatives in the Red Cross and Red Crescent Societies in Ethiopia, Eritrea, Kenya, Sudan, Somalia and Tanzania.

In 1999, the Regional Delegation described its role as: 'to assist National Societies develop disaster preparedness policies and plans for an effective disaster response. The emphasis will be on capacity building at the National Society level'. The Regional Delegation was requested by National Societies to undertake several initiatives related to capacity building, such as a training of trainers workshop on vulnerability and capacity analysis in Ethiopia, facilitation of a contingency planning workshop for government and the Red Cross in Uganda, and a request from Sudan to facilitate disaster preparedness and logistics training. In addition, the Regional Delegation has agreed to undertake a variety of other activities including:

- offering Kenya branch staff training in risk mapping analysis and other tools for vulnerability and capacity assessments
- preparation of a Disaster Profile, development of a National Society Disaster Response and Preparedness Policy and facilitation of the development of practical linkages between the National Society and the in-country Early Warning Systems at strategic branch level for the Tanzania Red Cross
- participation in contingency planning and standardisation of relief procedures in the Great Lakes region
- building/strengthening capacity in high-risk areas in the Francophone countries through the preparation of disaster preparedness for cyclones in the Indian Ocean Islands.

Conclusion

The International Federation of the Red Cross and Red Crescent has adopted policies to effect a pro-active disaster preparedness capacity in all of the current 176 National Societies. The dimensions of disaster preparedness now includes both the development of a response capacity and the creation of more effective mitigation programs that enable people at risk to gain mastery of their own lives while overcoming the vulnera-

bilities that inhibit social development.

This challenge has required the International Federation to develop new policies, frameworks and tools to support the capacity building required within National Societies to adopt new methods of outreach to vulnerable segments of their nations. National Societies have responded in a highly favorable manner—National Societies in economically affluent conditions providing financial and human resources to support the initiatives developed by National Societies with limited resources. Mitigation programs that are planned and initiated in coordination with vulnerable groups and which compliment national development strategies have begun to demonstrate a capacity to lessen the impact of local disasters while raising the capacities of at-risk groups.

The Palang Merah Indonesia has shown its capacity to develop a social safety net for vulnerable groups during socio-economic and political crises. The Red Cross Societies in the Caribbean have begun to develop their in-house capacities to 'serve those of greatest risk' and create an innovative program with the hotel industry. The Bangladesh Red Crescent Society is maintaining a constant disaster response aptitude to react rapidly to ever-frequent floods and cyclones, while also expanding the coverage of its Cyclone Preparedness Program. And, in the Eastern Africa region, the International Federation is supporting initiatives that will ultimately serve vulnerable groups from the strategically sound disaster preparedness aptitudes of National Societies.

In the July 1999 Forum (Strategy for a Safer World in the 21st Century: Disaster and Risk Reduction) organised by the International Decade for Natural Disaster Reduction (IDNDR), participants arrived at the following statement on disaster and risk reduction:

While hazards are inevitable, and the elimination of all risks is impossible, there are many technical measures, traditional practices, and public experiences that can reduce the extent or severity of economic and social disasters. Hazards and emergency requirements are a part of living with nature, but human behavior can be changed.

The International Federation is also conforming to the Geneva Mandate on Disaster Reduction, adopted on July 9, 1999, which declared:

'We shall adopt and implement policy measures at the international, regional, sub-regional, national and local levels

aimed at reducing the vulnerability of our societies to both natural and technological hazards through proactive rather than reactive approaches. These measures shall have as main objectives the establishment of hazard-resilient communities and the protection of people from the threat of disasters. They shall also contribute to safeguarding our natural and economic resources, and our social well being and livelihoods.'

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Author's Note

Dr. Goodyear is the Director for Disaster Preparedness with the International Federation of the Red Cross and Red Crescents Societies based in Geneva, Switzerland. He has thirty years international field experience in Africa, Asia and the Caribbean in the design, management and evaluation of economic, social development and emergency relief and recovery programs in developing countries.

Contact Details

Earl James Goodyear, Ph.D.
International Federation of Red Cross and Red Crescent Societies
17 Chemin Des Crets
Petit Sacconex, Geneve, Suisse
Case Postale 372
1211 Geneve 19 Suisse

Taiwan earthquake

Situation

On 21 September 1999, at 1.47 a.m. local time, (20 September 1999, 5.47 p.m. GMT) a powerful earthquake hit the central region of Taiwan. The earthquake measured 7.6 on the Richter Scale with the epicentre situated at latitude 23.8 degrees north and longitude 121.1 degrees east, 150km south East of Taichung. Over the following days over 6300 aftershocks hit the region the strongest reached a magnitude 6.8 on Sunday, 26 September 1999.

Taiwan is a densely populated country of approximately 36,000 square kilometres and 22 million inhabitants. The earthquake struck Taiwan's central county of Nantou and affected the neighbouring counties of Yunlin, Changhua and Taichung heavily. Whereas the eastern part of Nantou County is a rural area with mountains of more than 3,000 metres altitude, the western part of the affected region is densely populated urban area.

The settlements in the affected area contain heavily reinforced concrete buildings of up to 15 floors. The quake and subsequent aftershocks caused the destruction of 10,984 structures and the partial collapse of 7563 buildings. Damage occurred mainly through pillar failure causing buildings to lean, topple or collapse into basements. Many of these structures had soft first floor construction used for car parking. The pillars being unsupported laterally are the weakest part of the structure and therefore the first to collapse. Initial investigations suggest this was due to faulty construction and subsequently several builders were either arrested or restricted from leaving Taiwan. Some columns were found to contain empty oil drums and rubble making them extremely susceptible to collapse under earthquake conditions.

The earthquake and subsequent aftershocks caused 2400 deaths, 6190 injuries and 100,000 homeless. Estimates at the cost were US\$6 billion. Residents concerned with further aftershocks refused to go back into their dwellings and therefore camped in tents in any available open spaces. Sporting ovals and vacant blocks of land became tent cities overnight.

In the following days, 35 International Search & Rescue teams from 14 countries arrived in Taiwan to assist with the rescue effort.

Similar to Turkey, this earthquake was very close to the surface. Siesmologists

by Mark O'Connor, Station Officer,
Melbourne Fire & Emergency Service

estimate it to be 1.5km below ground. In 1935 Taiwan had a similar earthquake resulting in the loss of 3000 lives.

Taiwanese response

Taiwanese Emergency Management System

The overall responsibility for dealing with disasters lies with the National Fire Administration (NFA) under the Ministry of Interior. It was officially established in March 1995. NFA's operations fall into three main categories: fire prevention, disaster relief and emergency medical services. It not only deals with damage caused by fires, typhoons, earthquakes and other natural disasters, but is also responsible for dealing with chemical and nuclear emergencies, as well as major traffic accidents.

During times of disaster the administration sets up an emergency response centre, unites rescue teams, controls resources, and helps improve the government and public's ability to respond. The centre is located in Taipei. At provincial level coordination is ensured through county and city governments, which set up regional coordination centres.

Response to the earthquake of 21 September

Rescue and relief efforts responded quickly, aided significantly by a modern seismographic alert system established in 1996. Taiwan has approximately 1000 digital sensors spaced nearly every 3 km in metropolitan areas. This allows rapid calculation of location and magnitude of earthquakes and aftershocks. Once the information is processed it is distributed via email to scientists, emergency services and government agencies. This information also indicates shaking severity and level of damage likely to accompany such a quake.

Early in the morning of 21 September (5.30 a.m.), the Prime Minister of Taiwan released an instruction for disaster assistance and relief measures. According to this instruction ministries and other governmental entities were tasked with taking initial steps to activate the emergency response plan. The Ministry of Interior was tasked with activating the national and county emergency centres



Above, inset: The quake of September 21, and subsequent aftershocks, caused the destruction of 10,984 structures and the partial collapse of 7563 buildings.



On arrival, the Australian team accompanied the UNDAC team on a reconnaissance of the affected areas.

in Nantou, Yunlin, Changhua, and Taichung. The Ministry of Foreign Affairs was assigned to contact and to receive international disaster relief experts. The Taiwanese Ministry of Foreign Affairs had established a reception centre at the Taipei airport.

The first arriving international teams received an initial briefing and logistical support (vehicles). A guide with communications was assigned to accompany each foreign team to the area of operation. This provided a speedy response to the affected regions providing desperately needed assistance.

On 25 September 1999 an emergency order issued by the President of the Republic of China was released. A 6-month state of emergency was also proposed all over the island. The powers allow the government to use troops to conduct evacuations, provide relief and prioritise budgets without regard to existing laws on property, freedom of movement or parliamentary process. The laws have only been used 3 times in Taiwan's history.

The decree is aimed to:

- raise money by issuing Government bonds for reconstruction, irrespective of legal restrictions for these types of bonds
- extend long term loans to people affected by the earthquake
- settle displaced people by reconstructing levelled apartments regardless of current regulations concerning urban planning
- commandeer water resources, private estates, vehicles, aircraft, and vessels for relief purposes to cut down on bureaucratic red tape

- cordon off and evacuate disaster areas, by force if necessary, to speed up the relief effort and prevent the outbreak of disease

The United Nations Disaster and Coordination (UNDAC) team

Team composition

Rudolf Mueller, OCHA Geneva, Team Leader
 Veronique Galeazzi, OCHA Geneva
 Lennart Sorensen, Denmark
 Simo Wecksten, Finland
 Alf Berton Kiil, Norway
 Nils Andreasson, Sweden
 Chuck Mills, USA
 Duey Perks, USA
 Robert Haynes, USA
 Joey Bishop, USA
 Gary Littlewood, Australia
 David Kemp, Australia
 Mark O'Connor, Australia
 Wayne Staples, Australia
 Martin van der Sanden, Australia

Terms of reference

On behalf of the International Search and Rescue Advisory Group (INSARAG), a 6-person United Nations Disaster Assessment and Coordination (UNDAC) team was deployed to Taiwan.

Their role was to assist in setting up a Reception Centre for incoming SAR Teams, assess the level of damage and level of support & aid required, and operate an On-Site Operations and Coordination Centre (OSOCC) for the effective integration and utilisation of international SAR assets.

UNDAC Plan of Action

UNDAC Plan of Action must take into account:

- situation
- mission objectives
- in country counterparts (UN resident coordination)
- team organisation
- program of work
- logistics & resources
- mission support
- communications
- safety & security

Upon arrival at the Taipei international airport on Wednesday 22 September 1999 at 6 p.m., representatives of the Ministry of Foreign Affairs (MOFA) met the UNDAC team.

The MOFA had established a reception centre for international teams at the airport. Therefore it was decided not to create an additional structure. Several international teams arrived in Taiwan and did not report to the reception centre. These teams were operating on their own with no liaison or coordination from the Taiwanese.

To support in the coordination of foreign teams the rest of the UNDAC team were deployed to the affected areas. It was planned to either assign liaison officers to the county emergency response centres or establish sub-OSOCCs. This was not required due to the implementation of the County Emergency Response Centres.

To register all outgoing teams and collect information on lessons learnt, a Departure Centre was established on 25 September 1999 at the VIP Lounge at Taipei airport.

Liaison officers at the Taipei Emergency Response Centre

After a briefing at the Taipei Emergency Response Centre it was decided to assign 2 liaison officers from the UNDAC team to the centre to follow the situation, assist with the coordination of international teams and collect information to be included into the daily UNDAC Field Situation Report.

Reconnaissance/Liaison to County emergency centres

Over several days the UN team visited the worst affected Counties. An initial role was to locate any international teams that had not passed through the reception centre, and obtain details from them. The team also visited several regional command centres, observing their setup and operating structure.

Establishment of a Departure Centre

The Departure Centre was established at the Taipei international airport at the MOFA VIP Lounge on Saturday, 25 September 1999. This was manned by

Urban Search and Rescue

The National Urban Search and Rescue Steering Committee met in Canberra in July to progress the development of the national USAR capability. One of the key outcomes was the formation of working groups to develop a communications strategy and to identify issues and recommend strategies for developing protocols for the acceptance of international assistance into Australia following a disaster and for deploying Australian resources to international incidents.

The committee also met with representatives of the Australasian Fire Authorities Council (AFAC) Senior Level USAR Steering Committee to discuss strategies for ensuring a cohesive approach between the two groups.

For further information contact:

Trevor Haines
phone: 02 6266 5169
email: thaines@ema.gov.au

Exercise Northern Shield 2000

Defence's Darwin based Headquarters Northern Command (HQNORCOM) recently conducted a tabletop/telephone exercise, Exercise Northern Shield 2000. The principal aim of the exercise was to practice the Australian Defence Force and civilian agencies at local, State/Territory and Commonwealth level in coordination of all aspects of the management of an emergency which transgressed State/Territory borders across the top end of Australia.

The exercise scenario involved the suspected malicious introduction into Australia of an exotic animal disease which had spread across WA, NT and QLD, within the NORCOM area of operations. There was good participation in the exercise by State and Territory and Commonwealth emergency management and agricultural agencies.

For further information contact:

David Morton
phone: 02 6266 5325
email: dmorton@ema.gov.au

CBR consequence management

Over the past 18 months EMA has been instrumental in assisting States and Territories to develop capabilities for dealing with potential Chemical, Biological and Radiological (CBR) incidents. While the threat to Australia from the deliberate use of CBR materials is considered to be very low, the consequences of such an event could be severe with the potential for significant loss of life.

EMA involvement has included the conduct of training and awareness activities and assisting Olympic Venue States in reviewing their consequence management arrangements.

One of the most successful activities has been the development and delivery of three courses at the Australian Emergency Management Institute on the Management of Chemical, Biological, Radiological, Incendiary and Explosive (CBRIE) Incidents. EMA will continue to conduct an annual CBRIE course to ensure the maintenance of the skills and knowledge to enable emergency services personnel to make informed decisions on CBR.

For further information contact:

Don Patterson
phone: 02 6266 5165
email: dpatterson@ema.gov.au

Reception Operations

Activations of the draft Commonwealth Government Plan for the Reception of Australian Citizens and Other Approved Persons Evacuated from Overseas (COMRECEPLAN) for the reception of the Kosovo Displaced Persons in Sydney, the East Timorese Internally Displaced Persons in Darwin and, more recently, the Solomon Island Evacuees in Cairns, Townsville and Brisbane have validated the plan while identifying a number of issues requiring resolution.

EMA will host a workshop at the Australian Emergency Management Institute (AEMI) on 24-25 October 2000 aimed at reviewing the plan and obtaining stakeholder agreement-in-principle before formal endorsement is sought from the National Emergency Management Committee.

For further information contact:

Rod McKinnon
phone: 02 6266 5328
email: rmckinnon@ema.gov.au

Asia-Pacific Disaster Information Working Group Meeting

EMA hosted the inaugural Asia-Pacific Disaster Information Regional Working Group Meeting from 16-18 August 2000. Representatives from the following organisations participated in the meeting: Ministry of Science and Technology, China; Asian Disaster Reduction Center; Asian Disaster Preparedness Center; New Zealand Ministry of Emergency Management; South Pacific Applied Geoscience Commission; Pacific Disaster

Center; Center of Excellence in Disaster Management and Humanitarian Affairs; Australian Geological Survey Organisation; and Emergency Management Australia.

Delegates agreed that the aim of the Asia-Pacific Regional Working Group of Global Disaster Information Network (GDIN) is to improve the range of products and information available to emergency managers from international resources. This will be done by:

- increasing awareness of existing disaster information management capabilities and activities
- fostering development of national and other disaster information networks
- facilitating collaboration on projects of mutual benefit
- promoting sharing of information for disaster management.

The Working Group's immediate priorities are to conduct a disaster information management simulation exercise in 2001 and to survey existing disaster management information capabilities and resources in the region. The next meeting of the Working Group will be held on 20 March 2001 in Canberra in conjunction with the GDIN 2001 Conference. Membership of the Working Group is open to participants of GDIN and any other interested countries, and public and private organisations.

For further information contact:

Jonathan Abrahams

phone: 02 6266 5219

email: jabrahams@ema.gov.au

EMA Projects Program for financial year 2000-2001

The Emergency Management Australia Projects Program provides funding for projects which improve Australia's capabilities for preventing or dealing with natural or technological hazards and disasters. The program attracted over 140 applications from a wide range of individuals and organisations. EMA is pleased to announce that the following 16 projects were approved for funding in the 2000-2001 Financial Year.

- Emergency risk management for remote communities focusing on Aboriginal communities in the Pilbara Kimberley (01/2000).
Ms Moya Newman, Senior Community Liaison Officer, Kimberley/Pilbara, Western Australia State Emergency Service
- Exploring the wellbeing of both volunteer and career based emergency service workers from two fire service organisations (02/2000).
Ms Robyn Betts, Clinical Program Director, Victoria State Emergency Service
- Recovery awareness and education in South Australia (03/2000)
South Australian State Disaster Recovery Committee C/- Jill Coombe, Department of Human Service (Family and Youth Services)
- Design and distribution of 'Building for Nature' (04/2000)
Alan Grinsell-Jones, Master Builders Australia, ACT

- Production and distribution of a handbook 'Rotary and Disaster Support Guidelines' (05/2000)
Mr Alan Sampson, Rotary District 9600, Queensland
- Development of a community education program on cyclone-resistant buildings targeting building trades through TAFE and high schools (06/2000)
Dr Mahen Mahendran, Associate Professor of Civil Engineering & Director of Physical Infrastructure Centre, School of Civil Engineering, Queensland University of Technology
- Community participation model for flood monitoring, awareness and response in rural areas (07/2000)
Mr Wayne Gilmour, Floodplain Manager, West Gippsland Catchment Management Authority, Victoria
- Nature Acts: Severe storms and earthquakes (08/2000)
Denise Miles, Geography Teachers' Association of Victoria
- Australian Red Cross Emergency and Disaster Services Handbook 2000 (09/2000)
Margaret Golack, Executive Officer, Disaster Services, Australian Red Cross, ACT
- Fire safety education for ethnic communities using the Iraqi community of the Goulburn Valley as a model (10/2000)
Alex Caughey, Community Education Coordinator, Country Fire Authority, Goulburn Murray Area, Victoria
- Role of Local Government in Emergency Management (11/2000)
Mr Brian Clancey, Director, Legislation and Environment, Local Government Association of South Australia
- More than a Band-Aid: The development of strategies to improve recruitment, retention, training and support to Volunteer Ambulance Officers (12/2000),
Associate Professor Judi Walker, Department of Rural Health, University of Tasmania
- Flood risk assessment for caravan parks in NSW (13/2000)
Dr Stephen Yeo, Department of Physical Geography, Division of Environmental and Life Sciences, Macquarie University
- Risk preparedness strategy for Australia's cultural heritage (14/2000)
Robyn Riddett, Conservation Architect, Melbourne, Victoria
- Development of guidelines for assessment of personal and community resilience and vulnerability by Local Government, agencies and communities' (15/2000)
Dr Graham Marsh, School of Social Science and Planning, Royal Melbourne Institute of Technology; Mr Philip Buckle, State Emergency Recovery Unit, Department of Human Services; and Rev Sydney Smale, Statewide Recovery Coordinator, Victorian Council of Churches
- Development of a framework for supporting the local agricultural community in times of significant disease outbreak (16/2000)
Sandice McAuley and Jenny Branton, Safer Murrindindi Steering Group, Murrindindi Shire Council, Victoria

What's on at AEMI

EMA Website Update

Regular visitors to our website would have noticed some image changes lately. A different look and a streamlining process has set the pace for the web team to continue with the development and constant update of information for the emergency community.

Included in our website now is a section dedicated to teachers and students. 'Disaster in Education in Schools' provides some interesting facts and figures to help students with assignments, some lesson plans for teachers and some dramatic images of disasters to help illustrate your presentations.

Main topics on our site:

- About EMA
- Current Activities
- Community Information
- Virtual Library
- EMA Media Releases
- Education, Training and Research
- Disaster Education in Schools
- Conference Centre

Visit: www.ema.gov.au

All comments and suggestions are gratefully received and should be addressed to either:

Elizabeth Beard

phone: +61 3 5421 5248

email: ebeard@ema.gov.au, or

Rob Lee

Phone: +61 3 5421 5245

email: rlee@ema.gov.au

EMA National Studies Program for 2001-2002

EMA sponsors the EMA National Studies Program which sponsors activities such as workshops, seminars and study periods. The program addresses multi-disciplinary aspects of emergency management in order to enhance capabilities and/or further community understanding.

Proposals will be sought in February 2001 for topics to be considered for the 2001-2002 National Studies Program.

Further information and the submission proforma will be then available on the EMA Internet site, at www.ema.gov.au

Certificates for AEMI Courses

Since 1997 AEMI has conducted accredited courses and has issued certificates of attainment for successful completion of one or more assessment tasks. A number of these certificates state that the certificate is valid for a

particular time period. This time period is not required as the certificate is valid for an indefinite period.

Anyone who has one of these certificates and who would like the certificate reissued should contact:

Trish Power

phone: 03 54215296

email: tpower@ema.gov.au

AEMI Staff

Two long term Senior Education Officers have taken leave for 13 month periods from the beginning of September 2000. Merrick Chatfield has been seconded to the Asian Disaster Preparedness Centre in Bangkok and Nicholas Kanarev is doing his Bar Readers Course to become a Barrister at Law and will be reading for 6 months. Louise Mitchell will be acting in one of the positions and the other position has been advertised.

Emergency management officers' Professional Development Program Foundation course

The Foundation course of the Professional Development Program for newly appointed Emergency Management Officers was run at AEMI for the first time from 27th August to 3 September, 2000. Participants who attended this course found it to be a very positive learning experience that provided an introduction to the role of the Emergency Manager and the underpinning knowledge and skills required to undertake that role. Successive courses in the program will build on these foundations.

The course addressed individual skills and knowledge in the areas of personal effectiveness and the emergency management environment in which EMOs work. These topics were consolidated through the use of simulations to provide a learning experience in effective EM. In essence, participants learnt EM related knowledge and skills, while also looking at their work with others and reflecting upon their own performance.

Topics covered in this course included:

- *Personal effectiveness:* establishing and maintaining contacts and networks, marketing, facilitation techniques, leadership, political awareness, problem solving, public speaking, and dealing with different social groups such as volunteers and culturally diverse communities.
- *Effective emergency management:* concepts and principles of emergency management, EM arrangements, EM planning, and operational management.

The Foundation Course is the first of the three courses in the program. It will be followed by an ERM and Planning Course in February 2001, and an Operational Management Course in July/August 2001. The participants from

the Foundation Course will attend all three courses (the first delivery of this Program) as a group. The program is scheduled to be run again with the Foundation Course set for 15 – 27 April 2001.

For further information contact:

Judy Parker
Phone: 03 54215288
Email: jparker@ema.gov.au

Public Safety Training Package

The Public Safety Training Package has been endorsed by the National Training Framework Committee. Currently the training package comprises of competency standards, assessment guidelines and qualifications for the Emergency Management, Police and State/Territory Emergency Services sectors. It is anticipated that the training package will be expanded to include Defence, Fire, Australian Search and Rescue, Workcover Field Officers and Sherriffs.

For further information contact:

Ray Fogolyan
Executive Officer
Public Safety Industry Training Advisory Board
phone: 03 96397373

EMA publication news

Hazards, Disasters And Survival

VHS video tape

total viewing time: 90 minutes (6 x 15 minutes)

The Hazards, Disasters and Survival disaster education television series, comprising six programs, was produced by the Australian Broadcasting Corporation (ABC) with assistance from Emergency Management Australia (EMA) and each State and Territory. Videotapes of the series have now been produced for use in classrooms, homes, displays and presentations.

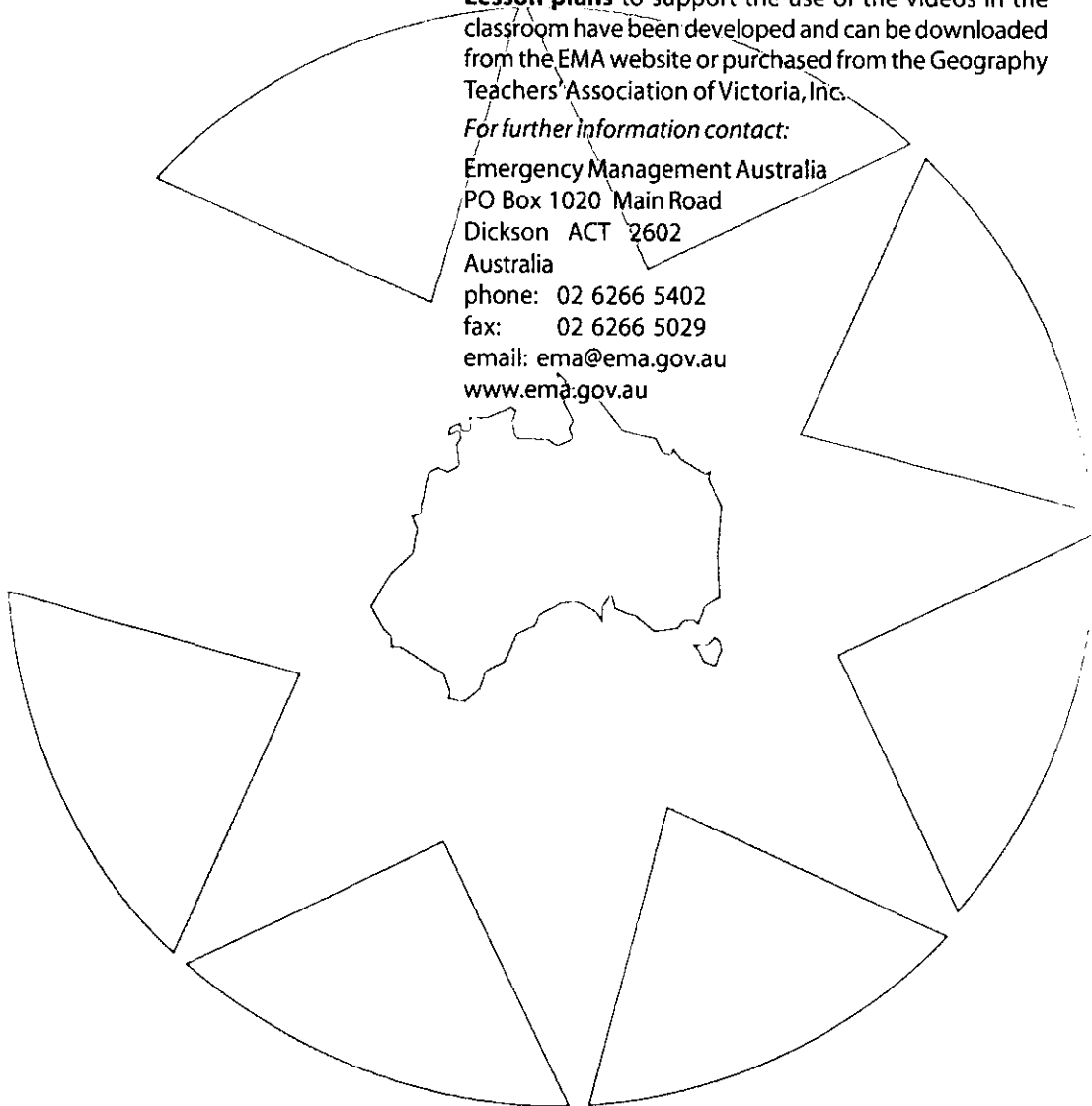
Each 15-minute program features interviews with emergency managers and people who have survived natural hazards and disasters. Australian news footage, and practical advice on how to prepare for natural hazards. Hazards covered are: severe storm; flood; bushfire; cyclone; earthquake and landslide; and heatwave.

The series which began screening nationally in October 1988 has been broadcast eight times at early morning and mid-morning timeslots as part of the ABC's Lifelong Learning and School Education series. An ABC survey indicated that 143,000 school students viewed the first series. Additional screenings have been programmed in the second half of 2000.

Lesson plans to support the use of the videos in the classroom have been developed and can be downloaded from the EMA website or purchased from the Geography Teachers' Association of Victoria, Inc.

For further information contact:

Emergency Management Australia
PO Box 1020 Main Road
Dickson ACT 2602
Australia
phone: 02 6266 5402
fax: 02 6266 5029
email: ema@ema.gov.au
www.ema.gov.au



Australian and American team members. A list of departing teams flight schedules was provided and regular surveillance of the departure lounges was carried out to locate teams not registered. The Departure Centre was to register the outgoing teams, receive data on their accomplishments, level of training and equipment, and comments (lessons learnt) about the mission.

Australia's role

In the days following the earthquake of 21st September, Emergency Management Australia (EMA) requested individual States nominate personnel for possible deployment.

On Thursday 23rd September the following Officers were selected as part of the United Nations Disaster Assessment & Coordination (UNDAC) Team:

Gary Littlewood *Qld Fire & Rescue*;

David Kemp *SA Fire Service*;

Mark O'Connor *Melb. Fire & Emergency Service*;

Wayne Staples *NSW Fire Brigade*;

Martin van der Sanden *ACT Fire Brigade*.

Information was also collected for EMA and the Urban Search and Rescue (USAR) National Steering Committee.

The Australian team met with Mr Rudolf Muller (UNDAC) and his team in Taichung City. Mr Muller conducted the briefing, and gave a situational report consisting of:

- areas affected
- damage sustained
- emergency management arrangements
- international Search & Rescue teams and their locations
- local emergency services
- roles of the UN team

The role of the Australians as part of the UNDAC team was of assessment and coordination, to collect data from the International Search & Rescue teams for the UN's report and to set up a departure lounge. The initial role of setting up On-Site Operational Command Centres (OSOCCs) changed due to the efficiency of Taiwan's National Fire Administration (NFA) in setting up a command structure. Therefore the expected workload assigned to the Australian contingent did not materialise. The Taiwanese Emergency Management arrangements are similar to Australia's however their emergency services lacked the skills and specialised equipment to deal with structure collapse.

Mr. Muller pointed out that previously, (eg Turkey) the UNDAC has been short staffed and they had no intention of being in that situation again. Mr. Muller requested we accompany the UNDAC team on a

reconnaissance of the affected areas and then requested we provide assistance in establishing the departure centre for all outgoing rescue teams. This was scheduled to begin the following days in Taipei.

After the briefing the team traveled to Dungshu in Taichung County where we observed and spoke with the Russian and Japanese teams. An interesting observation while traveling through the streets was the random collapse of structures. Perhaps one or two buildings in a street had suffered major structural damage whilst the others were relatively intact.

We then travelled to Dali in Taichung County and spoke with the Singapore Civil Defence team. The following day the team travelled to Nantou County and visited Nantou City. During our visit we spoke to the combined Swiss, German and Austrian team then proceeded to Nantou Emergency Command Centre and spoke to the Korean team.

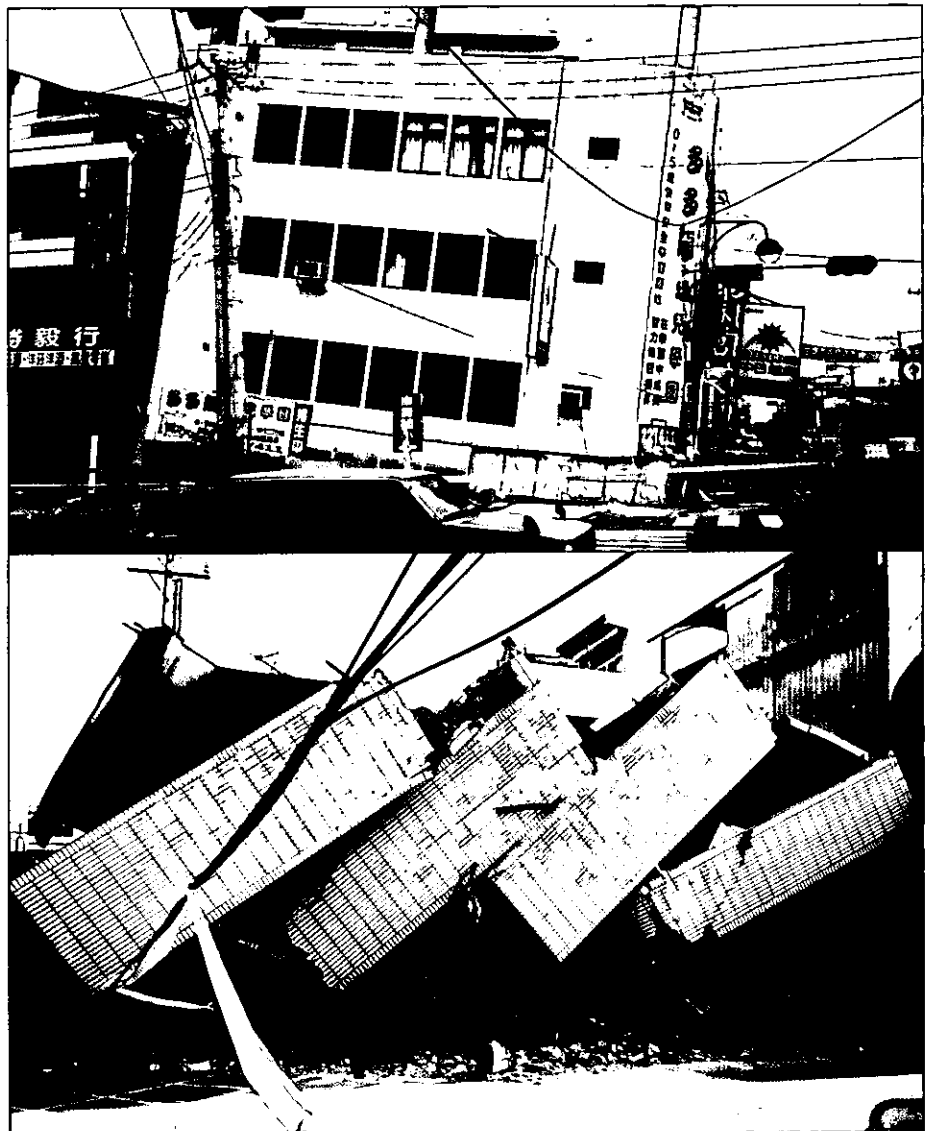
Over the 2 days a driver and a represen-

tative accompanied us from the Ministry of Foreign Affairs. Without this support we would not have been able to function due to language problems.

Having completed the reconnaissance we returned to Taipei to assist the United States Team establish and run the departure centre at the Taipei International Airport.

The mission for the Australian contingent was to be of 7-10 days duration. Due to the rescue phase concluding on Saturday 26 September, the International teams began leaving the Country earlier than expected. Once the departure centre was closed the Australian contingent left Taiwan and arrived back in Australia on Thursday 30 September 1999.

The 5 Australians worked closely with the Americans in setting up and running the departure centre. Although the hours were long and sometimes boring, the information obtained will be extremely useful for future UN and USAR deployments.



While traveling through the streets, the teams observed the random collapse of structures. Perhaps one or two buildings in a street had suffered major structural damage whilst the others were relatively intact.

International SAR Teams

International Teams deployed

In total, 35 international SAR and medical detachments were deployed to assist Taiwan in its relief efforts. 681 relief workers with 95 dogs came from abroad. The first team arrived in Taiwan at 19:20 on 21 September 1999.

Teams came from: Japan, Korea, Germany, United Kingdom, Turkey, United States, Canada, Russian Federation, France, Switzerland, Singapore, Czech Republic, Austria, Spain.

The largest team came from Japan. It consisted of 135 Search & Rescue personnel, 19 dogs & 10 medical personnel.

The Swiss, German and Austrian contingents combined their resources and provided a combined team.

The USA was certainly the best funded and equipped team. Their 93-person team arrived on a C5 galaxy at a cost of US\$8000 per hour. Total flying costs, return to Washington US\$288000. Cost of mission US\$2.2 million.

The larger and better-equipped teams brought their own transportation, ranging from 4WD's to semi-trailers. Teams without their own transport relied on hire vehicles

or government provided vehicles.

Several of the teams performed rescues during their mission. These were well documented by the international media. As with most large disasters the majority of injured and lightly trapped victims were rescued by passers-by or local emergency services. Once the mission changed from a rescue role to that of body recovery many of the teams began departing as they consider body recovery not to be one of their roles.

Conclusions

The International response to the Taiwanese earthquake once again proved that support is available for any disaster around the globe. Teams with millions of dollars of equipment and volunteer groups with only hand-tools made themselves available to assist the Taiwanese people.

Australia is fortunate that we haven't yet suffered large losses of life from disasters. Our geographic isolation means that the nearest USAR taskforce outside of Australia is at least 24 hours away. Therefore we must ensure our emergency services are prepared.

From observing the International teams working in Taiwan, Australia currently has

the equipment and skills to deal with a small-scale disaster in Australia. Transportation, logistical support, legislation and funding are the main issues the group highlighted. Should a large-scale disaster hit Australia, then the ability to handle and support several hundred search and rescue personnel arriving on short notice will also need to be addressed.

The Taiwanese were extremely grateful for all the assistance received. Many families lost everything including loved ones yet they still stopped their motor-bikes in the middle of the street to say thank you for coming to help them. It was certainly a humbling experience.

List of Acronyms

UNDAC United Nations Disaster Assessment and Coordination
INSARAG International Search and Rescue Advisory Group
SAR Search & Rescue
OSOCC On-Site Operations and Coordination Centre
NFA National Fire Administration
OCHA Office of Coordination and Humanitarian Affairs Geneva
USAR Urban Search and Rescue

New Books

Natural Disaster Management

A presentation to commemorate the International Decade for Natural Disaster Reduction (IDNDR) 1990-2000

Edited by Jon Ingleton.

Published by Tudor Rose, Leicester 1999

In 1989 the United Nations General Assembly proclaimed the 1990's to be the International Decade for Natural Disaster Reduction (IDNDR). Nations of the world together with UN Agencies such as UNESCO, WMO and the World Bank collectively pledged to combine resources, expertise and skills in pursuit of a greater understanding of natural hazards and their impact on communities and the environments on which these communities depend. Partnerships were forged among scientists, academics, industry and national bureaucracies at all levels, to work cooperatively towards the common goals of sustainable development and management of hazards to ensure a safer world more resilient to the impact of natural hazards and disasters.

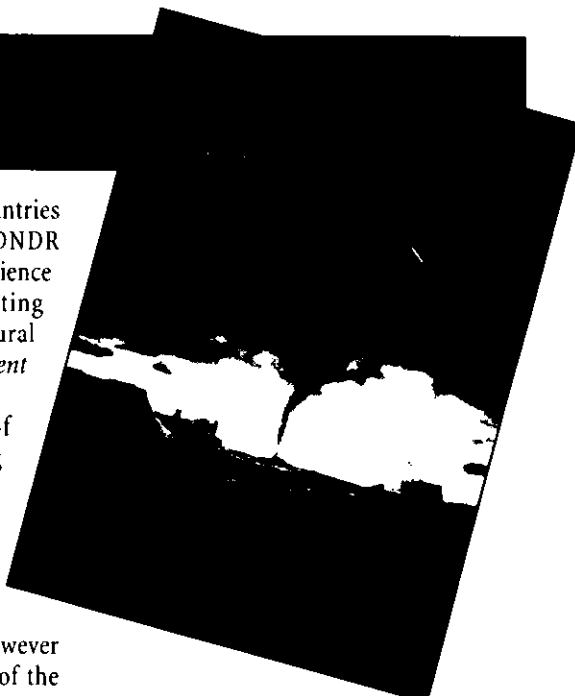
As the decade drew to a close researchers,

practitioners and experts from 32 countries who had actively participated in IDNDR collaboratively shared the global experience of understanding and promoting preparedness and mitigation for natural hazards in *Natural Disaster Management* (NDM) edited by Jon Ingleton.

NDM encompasses all aspects of natural disaster management, ranging from an explanation of individual hazards to socio-political consequences of individual events and to some extent future global challenges. The broad focus of this publication means that no one topic is dealt with in depth however it does provide a sweeping overview of the decade and the achievements. NDM is clearly set out in 18 sections and includes 103 individual relatively short and concise contributions. The common thread throughout the diversity of topics is the human perspective this means that the focus remains fixed on the impact of natural hazards on the human populations and the systems that support them. Contributors to NDM are from diverse backgrounds and offer such a broad range of experience and expertise and writing styles that is rarely seen in a single publication.

The welcome dedication for this official

presentation to commemorate IDNDR is provided by Kofi Annan the Secretary General to the United Nations and statements and messages of commitment and support are provided from Bill Clinton, President USA; Godwin Obasi, Secretary General WMO; Frederico Mayor, Director General UNESCO; Fernando Henrique Cardoso, President of the Federative Republic of Brazil; John Howard, Prime Minister of Australia; Jenny Shipley, Prime Minister, New Zealand; P. J. Patterson, Prime



New Books (contd...)

Minister of Jamaica; Paavo Lipponen, Prime Minister Finland; Hubert Ingraham, Prime Minister Commonwealth of the Bahamas; Viktor Klima Federal Chancellor Republic of Austria and Robert Mugabe President Republic of Zimbabwe. All acknowledge the progress and benefits acquired during the decade.

NDM begins with an outline and description of the financial, social and physical impact of disaster. These are considered in the global context and discuss past and likely future trends considering possible impacts of future climates. Terry Jeggle of the IDNDR secretariat then clearly sets out and reflects on the stated goals and aims of the decade as being:

- to improve the capacity of each country to mitigate the effects of natural disasters, in the assessment of disaster damage potential, and in the establishment of early warning systems and disaster resistant capabilities
- to devise appropriate guidelines and strategies for applying existing scientific and technical knowledge
- to disseminate existing and new technical information
- to develop measures for the assessment, production, prevention and mitigation of natural disasters through programs of technical assistance and technology transfer, education and training, and to evaluate the effectiveness of programs.

James Bruce of the IDNDR Scientific and Technical Committee then reflects on the lessons of the decade in terms of the link between disaster loss mitigation and sustainable development. These early chapters effectively set the context and framework for all following chapters.

The full range of hydrometeorological, seismic, geological and physical hazards are detailed and described, affording the reader a good understanding of the parameters of natural phenomena. Papers are short and are not bogged down with technical detail. All are written in the context of impact on human populations and contain interesting examples and illustrations. Environmental and technological hazards are also discussed and an interesting perspective on future hazards, in particular the impact of El Nino, is provided by Michael Glantz of NCAR. Social and community vulnerability to natural hazards is a recurring theme throughout NDM. Several of the papers directly address these issues with examples and case studies being drawn from the Caribbean, the South Pacific Island Nations, Asia and Australia. Ian Davis and Nick Bell of the UK analyse risk perception and offer some thought

provoking insights into community based vulnerability measures. Risk assessment was long considered as the process of simply defining the likelihood of a hazard occurring at a particular time, location and magnitude. In more recent times however quantifying the consequence of such an event and estimating the impact on the population and societal structures has been deemed to be of increasing importance. This paradigm shift is reflected in many of the papers.

One of the aims of IDNDR was to facilitate the development and production of effective forecasting, monitoring and early warning systems and technology transfer. In his keynote paper James Purdom of NOAA outlines the progress toward this end throughout the decade. Other papers demonstrate how the benefits of improved technology is being communicated to human populations in terms of effective warning and hazard response systems.

The need for efficient emergency management strategies to be in place was highlighted throughout IDNDR. Timely, appropriate, well-organised emergency management processes are recognised as being essential in time of hazard impact in order to preserve and maintain infrastructure, the health and well being of the affected population and to minimise the loss of life and enhance recovery processes. The benefits of an informed community participating in the emergency management process are convincingly illustrated in case studies from Jamaica and Turkey and Boris Porfiriev's moving account of Russia's Neftegorsk earthquake explains by example the need for efficient response and communications mechanisms.

Several of the contributions acknowledge an appreciation of the role of traditional mitigation, warning and hazard response practices and systems. Dr Chan Weng describes the effectiveness of traditional housing styles in Malaysia in mitigating against flood loss and traditional rice farming in paddy fields as a flood reduction technique. Joseph Chung of UNDP presents a strong argument for incorporating traditional lifestyle practices at all levels of the disaster management process from mitigation through to coping with recovery.

Information acquisition and sharing is essential for effectively reducing the risk stemming from natural disasters. One of the great achievements of IDNDR has been the raising of hazard awareness this has largely been achieved by the sharing of knowledge and information of past events and experiences at all stages of the disaster management cycle. Juha Uitto of UNU Japan emphasises the importance of delivering appropriate,

timely information at all stages of the disaster cycle to reduce human vulnerability of people and groups and stresses that information is power. Equity and inclusiveness are discussed as key issues in information dissemination and exchange and it is argued that this should encompass relationships between countries as well as between different groups and individuals within a country. The role of journalists is also openly explored, as are the emerging opportunities for taking advantage of the growing global electronic information networks.

A key theme throughout NDM is effective disaster management within the context of sustainable development. IDNDR's aim of ensuring a safer world in the future can only be achieved with commitment at all political and socio-economic levels within a nation this is overwhelmingly acknowledged by NDM contributors. South Africa's Ailsa Holloway presents a persuasive picture of Africa as being always risk prone but not always disaster affected due to chronic problems created by non-sustainable development practices.

Throughout NDM key achievements of the decade are detailed, discussed and assessed and in the final chapters these are summarised. To a lesser extent some future directions—'where to from here'—are explored however the publication is generally reflective. Ingleton's aim in producing NDM was to provide the opportunity to share global experiences and promote preparedness and mitigation. By doing this he hoped to improve the ability of individuals, groups and nations to foresee and mitigate the negative effects of natural hazards. I believe he has been successful in this endeavor, he has brought together a richly diverse group of experts who have provided a comprehensive summary of the key issues arising from IDNDR in a single publication that is interesting and very 'readable'. This publication will be useful to anyone interested or involved in emergency and disaster management—including students, practitioners, bureaucrats, politicians, academics, and individuals involved in insurance, telecommunications and remote sensing.

NDM is beautifully presented and is an excellent coffee table book. It will be a valuable resource in both personal and public libraries however at \$US120 for the hard copy version and \$US72 for the soft copy it is very expensive and this may limit its appeal.

Reviewed by Linda Anderson-Berry
JCU Centre for Disaster Studies.

For more information, visit the website at www.ndm.co.uk

When disasters defy borders: what we can learn from the Red River flood about transnational disasters.

Introduction

In his 1990 presentation to the World Congress of Sociology, Uriel Rosenthal stated that 'we are moving from cross-national research of separate disaster cases to transnational research demands imposed upon us by the international and transnational dimensions of modern disasters themselves' (Rosenthal 1990). This assertion should come as no surprise to researchers and practitioners alike. After all, political boundaries often intersect natural systems (Ingram et al. 1995) or rely on these systems—such as rivers and mountainous ranges—as their borders.

As a result, the actions taken in one country can significantly affect the disaster vulnerability and effectiveness of emergency management strategies in the neighbouring country. Recent cross-border floods, hurricanes, and ice storms,

by Tricia Wachtendorf, Disaster Research Center, University of Delaware

as well as technological disasters such as the 1986 Chernobyl radiation release and the 2000 Romanian cyanide spill, demonstrate the importance of examining borderland vulnerability, cross-border decision-making on environmental issues, and how or if political jurisdictions interact in response to the threat or impact of transnational disasters.

The 1997 Red River flood is a relatively recent case of a transboundary disaster. The flood occurred in the spring of 1997 in the Red River Basin—a 45,000 square mile area spanning sections of the prairie province Manitoba, Canada and states of North Dakota and Minnesota, USA.

northward (see table 1).

Several communities were completely overwhelmed by the flood-waters; residents in many more were forced to evacuate their homes as a precautionary measure; almost all expended resources in an effort to mitigate or respond to the disaster. More than 80,000 people were evacuated from their homes and the region suffered billions of dollars in flood preparation costs and property damage.

To study the transnational dimensions of the flood, in-depth interviews were conducted with sixty-two key government officials and non-governmental representatives from principle organisations on both sides of the international border and attended several flood-related public meetings in Manitoba and North Dakota. Document research was also conducted, from early March 1997 until approximately May 1998, which involved analysis of flood-focused news articles, press releases, maps, historical data, water-level updates, pictures, governmental and non-governmental reports, emergency response plans, and cross-border agreements.

Who depends on whom?

When planning for transnational disasters, it is important to consider whether or not organisations will depend on their foreign counterparts for information, direction, and resources. In the case of

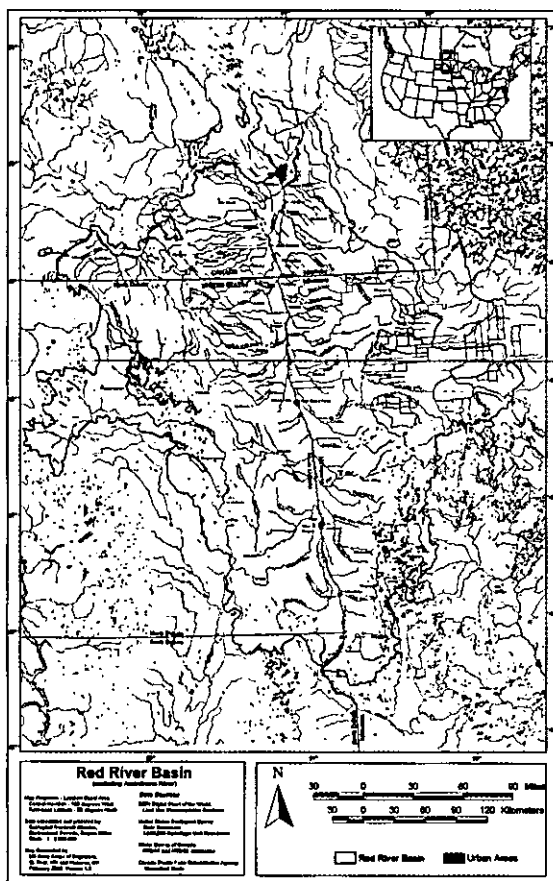


Figure 1: The Red River basin is situated in upper central North America

Setting the scene

The Red River Basin is found in the upper center of North America (see figure 1). While the majority of the basin lies in North Dakota and Minnesota, USA, the northern portion of the basin lies in Manitoba, Canada. The Red River is a 315 mile long, northwardly flowing body of water that serves as the state border between North Dakota and Minnesota, and vertically connects the many Canadian and American cities, towns, and rural communities along its banks.

The region has a long history of flooding, with significant flooding of the Red River occurring approximately every 10 years. But the 1997 flood was more severe than most due to high autumn soil moisture, high winter precipitation, the rate of the spring snow melt, the timing of the south-to-north progression of the melt, and spring precipitation. Over several weeks, the flood threat travelled

City or town	date of river crest
American Cities	
Wahpeton/Breckenridge	April 16
Fargo/Moorhead	April 18
Grand Forks/East Grand Forks	April 22
Pembina	April 26
Canadian Cities	
Emerson	April 27
St. Agathe	May 2
Winnipeg	May 3

Table 1: Progression of the 1997 Red River flood crest

the 1997 Red River flood, Canadian and American organisations were more dependent on each other for information than for shared decision-making or resources (although instances of the latter also occurred.) Moreover, much of the interaction between Canadian and American organisations that took place during the warning and response phases of the flood mirrored the relationships and dependencies in place during routine periods. The direction of that dependency—that is, who depended on whom—was often connected to the timing of the disaster impact, which in this case occurred at different times for each country.

One example of these relationship patterns can be found between Canadian and American forecasting agencies. The Red River flows northward and, therefore, American data was particularly important to Canadian hydrologists. In order to determine its water-level predictions for Canadian communities, the Manitoba Department of Natural Resources heavily relied on American organisations—such as the United States Geological Survey and the National Weather Service—for precipitation, soil moisture, snow-cover, stream-flow, and water-level data. Yet these same organisations routinely exchanged such data during non-crisis periods to determine potential water-levels for the Red River, as well as other rivers systems that flow south from Manitoba into Minnesota and North Dakota. Here patterns of interaction between Canadian and American organisations during the disaster were based on routine relationships; however, where there was an interdependence during routine periods, Canadian organisations were more dependent on the United States because the flooding threat moved from south to north.

For the most part, Canadian and American organisations were dependent on each other for information, including water-related data, road closure updates, water-quality reports, and accounts of the flood's severity. In several isolated cases, American organisations provided or offered resources to Canada. Several American communities provided excess sandbags to towns in Manitoba and some Americans who evacuated to Manitoba stopped to aid sandbagging efforts in the province. After the river's crest passed Grand Forks and East Grand Forks, the National Weather Service offered to send hydrologists to assist the Manitoba Department of Natural Resources. Manitoba turned down this offer, as they

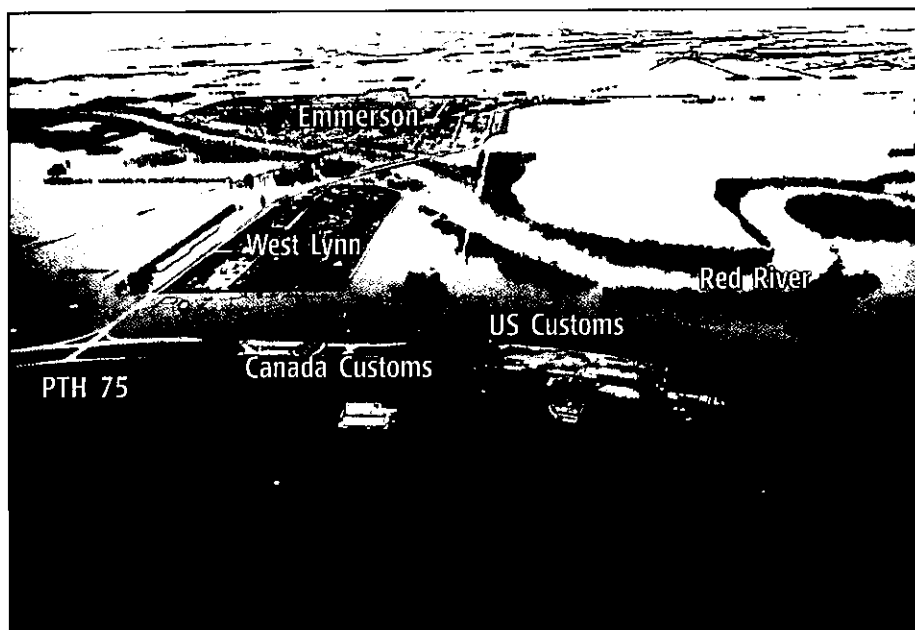


Figure 2: Aerial view of the international border. The dry area on the lower right is U.S. Customs, while the dry area on the immediate lower left is Canada Customs. The communities of Emerson, Manitoba and Noyes, Minnesota are in the upper portion of the picture, beyond the community of West Lynn. The normal channel of the Red River, outlined by trees, flows right to left in the picture. The line vertically intersecting the trees along the Red River marks the international border. (Photo courtesy of Manitoba Conservation, Water Resources Branch)

felt that the National Weather Service could better serve them by remaining in the American home-offices and providing Manitoba accurate water-level data.

Manitoba also provided resources to North Dakota and Minnesota. The City of Winnipeg, Manitoba offered temporary housing to American evacuees and Manitoba personnel were responsible for closing and monitoring a transnational ring dike protecting Emerson, Manitoba and several buildings in Noyes, Minnesota. Manitoba Hydro, a Canadian utility company, provided equipment, supplies, and man-power to the American utility company Minnkota Power. The cooperation between these two companies illustrates another example in which transnational interaction during routine periods provided the foundation for interaction during disasters.

The request for cross-border assistance came after the two American states suffered severe damage to electric power lines and poles as a result of an early April ice storm. Many houses were left without heat, and pumps that were fighting flood waters around fragile dikes were rendered inoperable. Manitoba Hydro, Minnkota Power, and several other small American utility companies were in the process of establishing mutual aid agreements in the months before the disaster struck. Smaller American electric companies benefit from Manitoba Hydro's size, expertise, and proximity while Manitoba Hydro sells electricity to these companies and relies on some of their power lines to transmit

electricity to states further south. Although the lines Manitoba Hydro relies on were not damaged by the 1997 ice storm, the mutual dependence between these organisations during routine periods led to American dependence after the ice storm and in preparation for the Red River flood.

There were few cases of cross-border planning meetings for decision-making purposes; most flood-response decisions were made independently in each country, albeit based on shared information. Transnational planning did occur, however, in regards to cross-border transportation routes. Continuity of commercial traffic during a disaster is an important consideration, particularly between nations—such as Canada and the United States—that have strong economic ties and trade relationships. In the weeks prior to the 1997 flood, organisations representing highways departments, customs agencies, and large trucking companies from both sides of the international border met to coordinate the rerouting of commercial traffic during the disaster.

These examples demonstrate that facilitating cross-border interaction during routine periods can improve interaction during disasters. Proximity, availability, expertise, and the existence of established relationships can sometimes make assistance from a neighbouring country faster and more efficient than relying on help from adjacent provinces or states. In fact, organisations across the international border may have

a vested interest in the well-being of their foreign counter-parts. In transnational disasters, flood-response issues within an organisation's own jurisdictions take priority; but these same organisations are often willing to assist agencies and departments in the other country as soon as they are able to.

Are agreements in place to guide transnational interaction?

And what about informal interaction?

Formalised agreements were important to the effectiveness of transnational interaction during 1997 Red River flood, but informal interaction was also instrumental to planning and response efforts. Some of the more formalised organisational structures that guided American and Canadian interaction included: planning meetings; transnational boards; written agreements, service contracts, and procedure manuals; and cross-border exercises.

Again, the inter-agency meetings regarding traffic rerouting exemplify how these organisations anticipated the flood's impact and took advantage of what preparation time they had. These formal planning initiatives generally consisted of one or two meetings in which relevant data, procedures, and contact information were shared. Agencies and departments typically did not meet with their cross-border counterparts again during the response phase. Although a debriefing meeting may have proved beneficial to future planning efforts, these organisations also did not meet after the disaster because, according to respondents, they did not encounter any serious coordination problems during the flood and they felt they had other pressing tasks to

address. It appears that once the hazard threat or the emergency has passed, it is a challenge for organisations to find time to meet—especially with foreign counter-parts—to debrief and build on their experiences.

Transnational boards are one way to facilitate cross-border interaction and planning. While meetings generally occur during routine rather than crisis periods, these boards affect the interaction that develops during the disaster. In the Red River Basin, some boards—such as the Prairie Regional Emergency Management Advisory Committee (PREMAC) and the International Joint Commission (IJC)—provide a forum to receive, review, and resolve emergency management issues. Others—such as the International Red River Pollution Board—have formal agreements and guidelines for action. Still others allow for formal discussion and planning on river-related—the Red River Basin Board—and non-river related issues—the Central North American Trade Corridor Association and the Red River Trade Corridor Association.

For boards that are more open in their membership and less stringent about mandatory participation, it is often difficult to maintain equal participation from organisations in both countries. Many respondents reported that they could not afford to spend the time needed to attend non-mandatory meetings during non-crisis times, particularly when they must travel several hours to attend. Several respondents felt that because of time constraints and multiple requests to participate on a variety of boards, they could not commit to regular participation. But because they do not restrict membership

to only a few representatives from each nation, these same boards provided an excellent opportunity for those who could attend to network and establish informal relationships called upon during the Red River flood.

Several formalised cross-border agreements guided Canadian and American emergency response efforts. For example, a 1909 treaty exists between Canada and the United States regarding boundary waters. As a result of this treaty, the IJC was formed in 1909 to resolve water-related disputes. Another important agreement between Canada and the United States, signed in 1986, outlines comprehensive civil emergency planning and management assurances. Articles governed by this agreement include the facilitation of moving evacuees, emergency personnel, material resources, and equipment; the treatment of foreign evacuees; requests for cross-border assistance; charges for assistance; and the structure and mandate of transnational groups—of which PREMAC is one. There are also agreements regulating the maintenance, monitoring, and closure of the cross-border, joint ring-dike surrounding Emerson, Manitoba and Noyes, Minnesota, as well as contracts for airborne gamma snow surveys. Organisations involved in the survey had substantial knowledge of what these documents entailed. In terms of the other agreements, however, only a few of the respondents I interviewed were very familiar with them. Yet this lack of familiarity did not seem to generate problems during the Red River flood, perhaps because the formalised agreements provided an implicit foundation for informal interaction, and these organisations had already established relationships with their counter-parts through routine interactions. Formalised documents and procedures can lead to bureaucracy; in the case of the 1997 flood, however, transnational agreements acted as enabling documents to expedite the emergency response and did not infringe on the ability of organisations to contact their counter-parts across the international border.

Informal interaction was common during the flood response. Border communities shared information about sand-bagging activities, evacuations, and updates they received from their respective country's organisations. Most of the informal interaction involved departments or officials telephoning to seek or provide answers to emergent questions and update each other on the flood's impact. Their informal relationships bolstered the trust

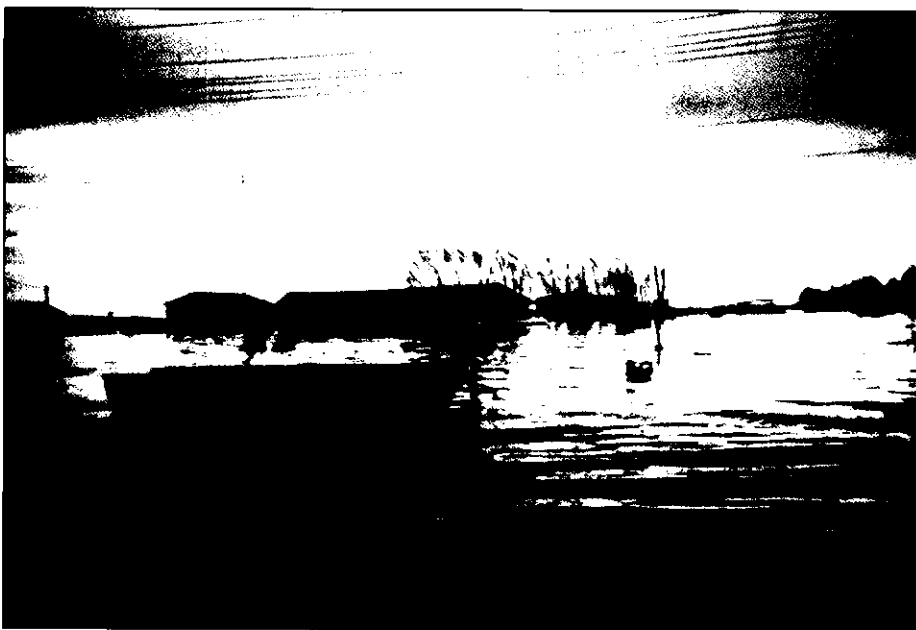


Figure 3: Property damage to downtown Grand Forks buildings.

they had in their counter-parts and the information these organisations provided.

When standardisation inconsistencies exist

Although Canada and the United States share many similarities in terms of culture, language, and the development of emergency management, there are clear differences in policy and practice that played out during the 1997 flood (Wachtendorf, 2000a).

Canadian and American hydrologists exchanged precipitation and water runoff data; however, organisations in each country calculated their flood predictions independently, each concentrating on the portion of the Red River Basin that falls within its respective jurisdiction and issuing outlooks based on the needs of other departments within their own country. As a general practice, hydrologists discuss their predictions for the international border with their cross-border counterparts and attempt to coordinate their predictions for the border communities of Emerson, Manitoba and Pembina, North Dakota. But sometimes these water-level predictions do not match. When the Red River threatened Grand Forks in April 1997, the National Weather Service justifiably concentrated much of its efforts on predictions for this city. While they did not update communities further north along the Red River during this period, Manitoba updated their own predictions for Emerson. After much of Grand Forks succumbed to the Red River, the National Weather Service increased its projected forecast for Pembina. Manitoba, after careful consideration of the information provided by the United States, opted to maintain its original prediction for the town of Emerson. Consequently, the Manitoban and the American river-level predictions differed by several feet during these periods. Ultimately, each organisation takes responsibility for the impact of its prediction on its own jurisdiction.

Organisations may also find that their structure and responsibilities differ from the agencies they interact with in other countries. In Canada, the Canadian Red Cross maintains registration services and handles donations. In contrast, American Red Cross holds the additional responsibility of providing basic social services, a role carried out by the municipalities in Canada. During the flood, a small number of Americans who evacuated to Manitoba did not know which organisation they were to approach for food, shelter, and



Figure 4: Flooding in Manitoba

clothing, and consequently experienced some delays in receiving assistance. As another example, the Manitoba Department of Natural Resources, a provincial department, is in charge of tasks in its jurisdiction that are administered by several state and federal organisations in the United States.

The differences between Canadian and American procedures extended beyond these few illustrations:

- Canada uses the metric system while the United States uses U.S. customary units of measurement;
- Manitoba reported water-levels in height-above-sea-level while the American states reported in height-above-river-bed-level;
- the Manitoba Department of Natural Resources reported three predictions: the best estimate as well as the lower and upper deciles (includes the 10% likelihood of the best case scenario based on ideal weather conditions, and the 10% likelihood of the worst case scenario based on adverse weather conditions) while the National Weather Service issued a best estimate prediction;
- Canadian and American connecting roads sometimes had different restrictions regarding allowable weight for commercial traffic.

Interestingly, these differences did not result in many problems during the 1997 flood.

Although some officials felt that these standardisation inconsistencies do not generate confusion, most of the respondents interviewed were cautious regarding the potential for error and expressed a heightened awareness about conversion and communication problems. Because most of these organisations work together

during non-crisis period and routine emergencies, many representatives from these agencies were already familiar with the standardisation inconsistencies and had also taken measures to address their threat to response efforts (Wachtendorf, 2000a). In some cases, it is appropriate to standardise practices across agencies. Other times, particularly when more than one country is involved, standardisation is neither possible nor is it ideal. Before a disaster strikes, organisations must look closely at their own and their neighbouring country's policies and practices, consider how these inconsistencies may cause conflict, confusion, or pose challenges during an emergency, and put in place safeguards to prevent problems from occurring in the future.

What has happened in the Red River Basin since the 1997 flood?

Transnational relationships between emergency response organisations and the structures that guide this interaction are not static. These relationships and structures change over time, often respond to emerging needs of the communities, and shape according to political demand. Since the 1997 flood, many changes have occurred in the Basin that will likely impact transnational interaction in future cross-border disasters.

In the weeks following the 1997 flood, the Canadian and American governments asked the International Joint Commission to form a binational task force to study the causes and effects of the flood and to provide recommendations for reducing and preventing harm from future floods. One of the activities the International Red River Basin Task Force pursued was a partnership with the Global Disaster Information Network (GDIN).

These two groups have worked together since the 1997 flood to develop the Red River Basin Disaster Information Network (RRBDIN). The RRBDIN is an open network of stakeholders in the Basin who participate in online workshops and have access on the network's Internet site—www.emforum.org/redriver/—to data, membership directories, reference material, and meeting schedules.

The International Red River Basin Task Force also held public meetings and commissioned numerous studies and reports on flood-related issues facing communities in Manitoba, North Dakota, and Minnesota. In April 2000, the International Red River Basin Task Force released its final report: *The Next Flood:*

Getting Prepared. In addition to suggesting strategies for individual jurisdictions, this document makes specific recommendations on ways to improve disaster resistance through binational input and coordination.

In December, 1998, the International Flood Mitigation Initiative was launched. This binational project held a series of community meetings over an 18 month period in an effort to facilitate partnerships and collect statements from stakeholders in the region about ways to reduce repetitive disaster losses and move toward effective, long-term disaster prevention and mitigation.

The recommendations put forth by these groups and, perhaps more impor-

tantly, whether or not these suggestions precipitate action will have significant effects on how transnational interaction will manifest itself in the Red River Basin in future disasters.

What about transnational disasters between other countries?

These findings from the 1997 Red River flood provide a useful starting point to understanding transnational disasters. We should remember, however, that because of characteristics particular to this disaster—for example, the close economic and cultural ties between Canada and the United States and the relatively slow-onset of the flood—we may find that when we study other types of disaster

Selected recommendations for transnational interaction in the Red River Basin

Organisations in each county must be able to maintain the ability to make decisions and take responsibility for actions taken within their own jurisdictions.

Organisations should take steps to anticipate and plan for what types of cross-border assistance would be beneficial in an emergency situation, under what circumstances, and how best it could be executed. This planning may involve some cross-border training or the documentation of formalised procedures. Before countries engage in transnational assistance, both sides should consider if such aid is really the best option available.

Organisations should be given support and encouraged to integrate new technologies into their cross-border emergency communications procedures and trained to maximise the benefits of these resources.

Organisations who currently do not interact with cross-border counterparts during a disaster may benefit from transnational board participation. Attendance could generate new networks and point to ways that cross-border interaction would benefit those agencies.

Transnational boards should not unduly impede upon participants' time or other activities. Instead, meetings should be limited in number and goal-focused to maximise participation across agencies and ensure effective planning and networking. In return, participants should be expected to participate in board meetings when they do take place. This involves organisations providing adequate support for them to do so.

Formalised [transnational] agreements, contracts, and manuals need to provide structure while still allowing for flexibility, adaptive emergency response, and informality. When they do so, formal organisational structures can allow for informal interaction and operations to take place simultaneously.

Private and public sector organisations should discuss ways their skills might be transferable across the border in an emergency situation and seek out opportunities where mutual aid is beneficial and appropriate. When cross-border assistance does occur, guides should be provided to the international teams to facilitated requests and help with standardisation problems that may arise.

Standardisation inconsistencies do not necessarily need to lead to problems in disaster response if: 1) the individuals or organisations involved are aware of the inconsistencies; 2) they are also aware of the potential consequences those inconsistencies may cause within and outside of the respective organisation; and 3) they take adequate steps before the disaster to prevent problems in their response.

A more detailed account of these and other recommendations for the Red River Basin can be found in *Interaction Between Canadian and American Governmental and Non-Governmental Organizations During the Red River Flood of 1997*, a report by T. Wachtendorf (2000b), commissioned by the International Joint Commission.

events or coordination between different nations, organisations exhibit quite different transboundary interaction patterns.

Consider organisations in neighbouring countries that do not have the same level of access to technology as Canadian and American organisations, or nations that have unequal access to technology. The presence or absence of cross-border technological models and technology-based communication channels—such as faxes, the internet, email, and satellite systems—would impact a nation's ability to predict a disastrous event, share data transnationally, and communicate with cross-border counterparts. Unequal access by one country to technological models and equipment used for prediction could render the other country more dependent on the technologically advanced country than if access to the technology was equal.

Political conditions within and between the impacted countries would affect how they interact transnationally during a disaster. National security concerns or political fallout might prevent a country from providing complete warning information to other nations regarding the release of hazardous materials into the environment. Canada and the United States have a strong bilateral relationship and consequently cooperate during emergency events. In sharp opposition, countries engaged in political conflict may not provide information or assistance to each other. Governments and other organisations could receive political pressure to assist a neighbouring country in need, or, on the contrary, receive pressure not to aid the adjoining nation and instead invest all resources in its own country's disaster response. Likewise, the political affiliations of the ruling governments could influence the amount and nature of interaction during a disaster or to cross-border disaster planning.

Economic conditions would also impact interaction during a disaster. Nations that rely on each other for trade might have better-established networks and be more willing to assist each other during a disaster than countries that do not have economic ties. In addition, nations and organisations under financial constraints may be less able to provide cross-border assistance and travel allowances for transnational meetings than wealthy or less financially conservative countries.

Demographic characteristics play an instrumental role in the interaction between disaster-impacted countries.

Examples of possible influences include the population size, its density, and its distribution. Countries may show reluctance in assisting some neighbours because of lingering racial, ethnic, or religious prejudice against its citizens. Other population demographics—such as income—could render residents from a region in one country especially vulnerable to the disaster and, therefore, more dependent on the other country.

In addition to technological, political, economic, and demographic conditions, differences in language, culture, ecology, geographic terrain, laws, and immigration policies can influence an organisation's shape, the actions it takes (Hall 1972), and its interaction with other organisations in transnational disasters. Furthermore, the influence of gender, race, and class systems on an organisation's structure impacts its institutional assumptions, expectations, and consequently its actions and interactions (Anderson 1997; Acker 1992). As countries become more globally connected through politics, environmental issues, economics, and technology, the need to understand transnational phenomenon like cross-border interaction during disasters becomes increasingly relevant and pressing. The 1997 Red River flood demonstrates that, despite challenges, successful binational coordination can be achieved under certain conditions. Effective coordination might be more difficult to accomplish between organisations whose routine relationships are notably strained or in countries where the conditions discussed above are quite different than what currently exists in the Red River Basin.

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About the Author:

Tricia Wachtendorf is originally from Manitoba, Canada and is currently a doctoral student with the Disaster Research Center and the Department of Sociology & Criminal Justice at the University of Delaware. Her main research interests are transnational emergencies, social vulnerability, and disaster culture. An earlier version of this paper was presented as 'A River Runs Through It: Cross-Border Interaction During the 1997 Red River Flood' at the Research Committee on Disasters, World Congress of Sociology, Montreal, Canada, July 1998. Tricia Wachtendorf can be contacted at twachten@udel.edu.



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Are Emergency Services becoming private?

Introduction

'Privatisation: the process by which the responsibilities of government are transferred to unaccountable corporate hands' (Silverstein, 1997)

'The industrial model of government fails to work anymore ... [and] has finally outgrown its usefulness. The changes taking place are so profound that we have to go back to scratch ...' (Sturgess 1996)

There is a global trend towards increasing the involvement of private enterprise in functions formerly performed by government. This 'internationalisation of privatisation is an observable phenomenon, the consequence of a range of factors such as shared ideologies and the pervasive influence of World Bank and IMF policies.' (Redgwell 1999) and now the World Trade Organisation. It is also a function of the dominance of the US economic and social agenda in the post cold-war era (Catley 1997) seen especially in the emphasis on free trade and deregulated economies. Nevertheless, pursuit of this trend is particularly vigorous in Australia and driven by the ideology of economic rationalism manifest in the National Competition Policy. The approach in Europe and the US is generally more strategic with great care taken over perceived national economic and political interests. Australia may be unusual too, in its increasing dependence on a few large consultancy firms for many of the functions of government (Correy 1999), combined with a generally weak regulatory structure. The debate is not about whether privatisation should occur, but when and how—and this despite evidence that the public are less than enthusiastic. Even justice and some emergency services are being hived off—in many cases to foreign interests—and there is much excited commentary about transferring the functions of government to private enterprise (Stugess 1996).

In this paper the term 'privatisation' does not simply cover the sale of assets. It includes a variety of other approaches to involvement of the private sector in the management of assets and performance of functions including franchising and contracting out. It is part of a broader set

by John Handmer, School of Social Science, Middlesex University, Queensway, Enfield

of changes to government generally known as 'marketisation' and the closely related phenomenon 'managerialism' (Kouzman and Korac-Kakabadse 1999). This macro trend is characterised by, among other things:

- rejection of long term planning in favour of market forces
- deregulation of 'unnecessary' bureaucratic controls
- privatisation of public services
- imposition of strict spending controls on public bodies
- a general weakening of local authority power, and
- the use of voluntary controls allowing choice wherever possible

(Redgwell 1999—quoted from Bell, S., in Ball and Bell on Environmental Law. London: Wm Gaunt and Sons (1997)). We could add to this list the search for least cost approaches, a shift from a process and equity focus to an emphasis on measurable outputs, and a desire for the appearance of competition.

There appears to be nothing inherent about warnings and emergency management that makes them exempt from this general trend, and in many parts of the United States there have long been public/private sector partnerships to deal with flood and other weather warnings (Stewart 1997). This paper examines privatisation from the perspective of emergency services. It suggests that the sector is becoming increasingly private by default as the concept of emergency planning expands to include economic health, business continuity planning and community safety—and as other organisations on which emergency services rely become private or contract out services. As well, it is likely that organisations responsible for warnings and emergency services will come under increasing pressure to adopt many of the attributes associated (or assumed to be associated) with the private sector.

This is a pragmatic discussion that is not concerned with theory or ethics, with

the details of National Competition Policy (Lunn 1998, Wearne 1998, Rix 1997, Butler 1996, Thomas 1996); or whether warnings and emergency services are 'public goods' in economic jargon (explained very simply as things for which it is difficult to create a market); nor does it assume that the private sector is inherently more efficient or effective than the public sector when performing the same task in similar conditions—there being little empirical evidence for this common assertion (Hill 1996). The discussion does not examine specifically search and rescue and other specialist areas which may be prime targets for privatisation or at least for full cost recovery from users. Instead, it sets out some of the main issues associated with the trend towards privatisation and discusses the implications.

Why the fuss?

Any serious consideration of the advantages and disadvantages of privatisation needs to move well beyond the usual simple ideological assertions of the superiority of the private sector. For example, Peter Costello, the Australian Treasurer (finance minister), has asserted that there is nothing that government can do better than the private sector—although little empirical evidence for this is available (Hill 1996). And it ignores the reasons underlying the massive expansion of government this century: to wage (economic and military) wars, and as a result of private sector failures: illustrated by the 1930s depression and distributional issues. *Table 1* (overleaf) identifies some of the arguments used by both supporters and opponents, and illustrates the gulf between them. See also Kouzman and Korac-Kakabadse (1999) for a discussion of some of these problems.

In addition to this ideological assertion, supporters of the private state argue that it will make Australia more internationally competitive and flexible, that individuals are the basis of society and should be as free as possible to express themselves through markets, which are a fairer and less contentious way of allocating resources than democratic government, there will be more scope for innovation, and no political interference. An advantage to Australian statutory

authorities and possibly emergency services is removal from control by treasuries - which in the case of England in the 1970s played a key role in the near collapse of the water sector described as all but derelict by Hassan et al (1996). An environmental example illustrates the general problem: 'Until recently taxes to tackle pollution problems faced the seemingly insuperable opposition of the [UK] Treasury to hypothecation, namely the earmarking of charges and taxes for specific purposes' (Redgwell 1999). Funds raised by charges for a government service, are removed by treasury and often allocated to other areas: they are not necessarily (or rarely) reinvested in the area which generated them. Also often appealing to government is the ability to get rid of intractable problems and the likely reduction of liability.

It is frequently assumed that privatisation equals deregulation. Although not argued in Australia, an enhanced ability to regulate was seen as an advantage in Britain, in particular with the sale of the major utilities. Much has been made of the negative environmental impact of privatisation and marketisation. Yet, taking the UK as an example there is no clear evidence one way or the other: 'the mere fact of privatisation does not necessarily entail deregulation.' (Redgwell 1999)—although the UK is of course under the influence of the European Union while Australia is party to no remotely equivalent international blocks. In some British sectors such as water, privatisation through sale has seen the creation of an independent, and by the standards of the past, a very forceful regulatory regime. This was not considered possible previously due to the conflict of interest inherent in a system where the offender was also the regulator—rather like the proposed Australian system of meat inspectors paid by meat processing companies: 'it is the fox guarding the hen.' (Australian Financial Review, 22 July, 1997. Quoted in Rix 1997)

For emergency service agencies advantages might include: increased distance from politics, the priorities of treasuries and a public sector environment which is chaotic and chronically under-resourced in many countries; greater awareness of 'core business'; and competitive pressure for continuous improvement—it could be argued however that 'competitive pressure' is being applied effectively in other ways, such as public scrutiny.

The critics of privatisation, marketisation and managerialism too may take an ideological stance (albeit often based on established theory, see Chisholm 1997),

Advantages	Disadvantages
Ideology/political advantage	Ideological arguments
Increased competition & reduced costs	Subverts democratic processes
Efficiencies gained through 'slimming down' prior to sale	Often little competition in reality
Greater consumer choice	Burden of change falls on labour
Reduced liability	Performance in high profit areas only leading to service gaps
Staffing flexibility	
Resolves debt problems	
Yields funds for other political purposes	
More innovation and performance	
Removal from treasury control	Can go bankrupt
	Corruption
Improved managerial accountability	No transparency
Accountability is increased via the market	Decreased accountability as normal business practice
Removal from politics	Community obligations ignored
Fairer allocation of resources through markets	Negative distributional impacts
	Govts ignoring responsibility by off-loading problem areas
	Loss of control of key sectors - possibly to foreign interests
Increased ability to regulate	Difficulty writing appropriate contracts
Better definition of tasks	Loss of in-house expertise

Table 1: Some advantages and disadvantages of privatisation. (This table is based on points drawn from the papers listed in the reference list in addition to comments and suggestions from other literature and colleagues. It lists a wide range of issues without suggesting that some are necessarily more important than others. Each example will be unique and involve a different set of potential advantages and disadvantages.)

arguing that society is much more than individuals and that communities and networks are essential parts of social cohesion, that competition is limited in a world dominated by increasingly few players with weak regulation, that the burden of restructuring falls on labour not management, that government should not offload difficult problems, and that community service obligations—a key rationale for emergency services—are difficult to reconcile with competition. An implicit underlying principle of Australian warning and emergency services is that they are more or less equally available to all. In any move towards privatisation an important question concerns how this universal access would be maintained.

It is also argued that competition may not achieve the stated objectives, that the 'public interest' is commonly treated as irrelevant even though it is set out as an important test of the applicability of the National Competition Policy (eg see Rix 1997, Cater 1997). More seriously, it is clear that accepted democratic processes of consultation, transparency and accountability are often ignored in the enthu-

siastic implementation of these new policies and approaches (in Australia see Rix 1997; in Britain see Redgwell 1999). To some this has echoes of earlier debates on the accountability of statutory authorities (Simms 1999), and it raises the broader issue of the rights of citizens versus budgetary efficiency.

Ways of achieving privatisation

We can think of privatisation as occurring through obvious deliberate decisions, by stealth or incremental change, or unintentionally. The categories are not exclusive, and there are many other ways of thinking about the issues, for example whether the intention is to create competition, save tax money, reduce liability, avoid awkward political problems, or to transfer responsibility for seemingly intractable problems.

Through deliberate decision:

- sale and complete handover or abandonment, the UK public utility model (for example water) is the most dramatic where the utilities were sold on the international stock market
- franchises or contracting out, e.g. some security arrangements, parts of the armed services, fire and ambulance

- the various forms of corporatisation— involving an increasing proportion of the public sector— do not themselves constitute transfer of public enterprises to the private sector. But, through changes resulting in a more commercial orientation, they are often an important step on the path towards privatisation or contracting out

Through an incremental or generally less obvious process:

- establishing alternative programs outside the public sector, e.g. landcare. Landcare is generally seen as a community rather than business based program, but if farms are businesses, then it should be seen as having a significant private sector involvement
- gradual sale or contracting out of support functions such as cleaning, maintenance, transport, data, communications, human resources, local security etc, which over time constitute a significant part of the organisations involved and typically raises the question of core business. Often this occurs without any public debate or even knowledge

Unintentional privatisation:

Privatisation may occur unintentionally or even when government resists. This is an area which has received little attention, but is probably a major contributor to the privatisation phenomenon.

- people or enterprises may want higher levels of service or a different service— perhaps one more responsive to their individual needs. The proliferation of private broadcast media and telecommunication companies in places where it was previously either a government monopoly or very tightly controlled being one outstanding example, and the massive shift from state to private schools in Australia being another. Examples falling within the ambit of this paper would include private healthcare and security firms, emergency planning by business and households, and much of the voluntary sector which is central to emergency and recovery management in Australia
- charging a fee for a specific service formerly funded from general tax revenue. This may encourage private competitors. Charging for search and rescue, as is the case in much of the US, or for the provision of security, is likely to attract profit-making providers
- the service may be reconceptualised in terms of substance, what it does, or process, how it does it, with the result that private sector activity is seen as part

of core business, with the result that most core activity is outside government organisations. For example, an emphasis on building partnerships, and on a facilitative rather than a command and control position, acknowledges that other groups play major roles

In Australia, privatisation of emergency services seems most likely to fall within the third category above, given that there is no obvious agenda to sell or contract out the full services, nor does there appear to be any clear intention to establish alternatives outside the existing organisational structure. However, emergency services may be affected by the privatisation of organisations or facilities on which they rely, examples would include many local government functions; and these may become private in any of the ways listed above. There are also many voluntary groups which play important roles in emergency management— but their roles could change significantly if government formally contracted with them for their services.

Rapidly expanding private sector involvement

Whatever our views on the advantages and disadvantages of privatisation, the emergency service sector is becoming increasingly private. This is not something announced by government or necessarily even part of government policy. Although the overarching trend in the rhetoric of Australian governance is to outsource, privatise or contract out functions in almost every conceivable area (Stugess 1996, Hancock 1998), this has yet to impact heavily on most emergency service agencies. However, police are affected especially in Victoria and

there are large companies running ambulance and fire services in many countries—in addition to general security functions. As National Competition Policy is applied more of these areas may go to tender inviting international competition from these experienced overseas companies.

The Australian emergency management sector is not being privatised by any conscious decision, rather there are trends in the sector, as well as in government generally, which make greater involvement of the private sector inevitable. Table 2 sets out three general types of trend. One concerns trends in government, especially local government, which appear to have no direct relationship with emergency planning and management. These have seen the outsourcing or contracting out of many functions, with the result that government authorities and emergency services have found that the availability of important resources and expertise is no longer guaranteed. Some emergency service managers feel that their ability to do their work properly has been compromised by this shift to the private sector— a shift made with little if any attention to the implications for emergency management. In theory at least, the outsourcing arrangements could have been written to take account of this— and it is not clear how serious this problem is in practice.

The other two categories of trend in Table 2 deal with what emergency planning does and how it goes about that task. The trends are about handing power and responsibility to those at risk, and about broadening the idea of what constitutes emergency planning. Power and responsibility is moving from government agencies to individuals, communities and

Trend from:	Trend to:
<i>What government does:</i>	
All activities in-house	Outsourcing many support services & creating a competitive environment
Emphasising process & equity	Measuring quantitative outputs
<i>What emergency planners focus on:</i>	
Hazards	Resilience and safety
Response	Proactive risk management
Lives and property	Plus economic, community and environmental health
Event focus	Situation focus
<i>How emergency planners work:</i>	
Telling other stakeholders	Negotiating
Command & control	Facilitating & coordinating
Problem owned by the agency	Problem owned by those at risk & responsibility is shared
Them and us	Partnerships

Table 2: Trends in, and impacting on, emergency management.

commerce; and continuity and safety planning focus more on the situation rather than the event. Individual safety remains key, but beyond that the emphasis is increasingly on maintaining economic and social continuity so that the impact of emergencies is minimised. The challenge is to encourage and support planning activity by whole communities so that businesses, non-profit organisations, households etc are able to work out for themselves what they need to do. The result of this approach may be to shift the emergency management sector from a well defined public sector organisation to one where individual households and businesses play the major role: in other words much of the activity would be in the non-government sector.

In summary, the trends outlined above are greatly increasing the involvement of the private sector and individuals in emergency planning—and are thereby by default moving the whole field towards privatisation.

This is not without its problems and challenges. One is to maintain a broad public interest agenda while working with the narrower interests of commercial enterprises. It appears that more attention could be given to the regulatory framework and to the use of legally binding contracts. Another challenge is to ensure that partnerships work and deliver (Millican 1999). The expertise of many emergency planning groups may be unsuited to a more negotiated facilitative. Although there is no question that traditional expertise is required, new skills are needed to ensure that emergency service agencies remain central and key to the field. If they do not—or if it is perceived that they do not—then the risk of (and from) competitive pressure may increase.

Conclusions

Australia governments seem unlikely to privatise or otherwise dispose of their emergency service and security functions at present. Nevertheless, emergency services in Australia are increasingly located in the private sector for three main reasons:

- the outsourcing or contracting-out of many functions on which emergency services rely
- commercial enterprises are increasingly interested in the area especially for the application of information technology
- because of a reconceptualisation of what emergency planning and management should strive for.

The obvious conclusion is that

partnerships and cooperative activity between the public sector, commerce and communities are the future, although these are not without limitations and problems (Millican 1999). The role of emergency services is likely to be increasingly one of facilitating—but this is not a lesser role. It is quite probable that it is a much expanded role requiring at least some different expertise. The trends point to this future, but empirical evidence is needed for all the points made in this conclusion.

As the acquisition of government funds continues to become more competitive, emergency services will need to demonstrate that they give outstanding value for money invested. One way of doing this is to ensure that their activities have maximum leverage and impact. Facilitating others to plan and respond—especially to plan for economic, community and lifeline viability and continuity—is likely to payoff. A similar observation would apply to warning services which need to ensure and demonstrate that their services are used to good effect. Emergency related agencies should themselves make contingency plans by preparing for a more competitive environment.

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Authors contact details

John Handmer, School of Social Science, Middlesex University, Queensway, Enfield EN3 4SF, UK, johnhandmer@hotmail.com

The importance of measuring the social costs of natural disasters at a time of climate change

Introduction

Most events, including natural disasters, can be described in a variety of ways. A disaster can be described in terms of the number of deaths, the number of buildings collapsed, tons of food-crops destroyed, the kilometers of roads washed away, the number of bridges lost, tons of soil dumped, tons of topsoil lost, inches of rain accumulated, number of power transmission towers downed, and so on. These are the *descriptors* of such an event. Some of these descriptors refer to damages that will have to be made good, if the social life of the community is to return to normal. Typically the community might seek some outside assistance. After all, that is the defining characteristic of a disaster.

But there is also intrinsic merit in seeking to determine the total *social losses* associated with a particular disaster. However, we suggest an important additional reason: global climate change is likely to increase the severity and frequency of disasters that are climate related (Etkin 1995, 1998; White and Etkin 1997). Thus the cost of disasters will be an important input in the broad measures required for adaptation to climate change. In this paper we argue that for that purpose, existing cost estimation methodologies do not generally provide for a full accounting of disaster impacts, and therefore undervalue the need for adaptation. (Smit 1993; Smith and Tirpak 1989; Watson et al. 1986; Ross 1996; Rowntree 1993).

The cost estimation methodology recommended by the US National Research Council (NRC) and accepted by the (US) Federal Emergency Management Agency (FEMA) does not take all costs into account and can be improved.

Trends in natural disaster

Disasters are sometimes classified by their country or region of origin. In particular, the distinction between developed and developing countries is useful since the vulnerabilities of these societies tend to be very different. Though the costs of natural disasters has been rising world-

by Mohammed Dore, Brock University and AIRG, Environment Canada and David Etkin University of Toronto, and AIRG, Environment Canada

wide over the past few decades, the data shows that the loss of life has increased in developing countries, but decreased in developed countries. Generally, developing countries are more vulnerable for a number of reasons, including poverty and an inequality of wealth. In addition, programs in poor countries to share risk such as insurance or government disaster assistance are not well developed. Moreover, development often takes place without consideration of risks resulting from natural hazards, and their infrastructure is often less resilient. Thus while Hurricane Andrew in 1992 killed 62 people and cause damage of US\$27 billion, mostly in the US, Hurricane Mitch killed an estimated 11 000 people in Central America and caused damage estimated to be only US\$5 billion (Light-hill et al 1997).

In 1998, according to the World Bank, natural disasters killed more than 50,000 people and destroyed \$65 billion worth of property and infrastructure (see World Bank web site). Some 95 percent of disaster-related deaths occurred in developing countries, where the poorest of the poor are the worst affected. The World Bank has lent more than \$19 billion for post-disaster reconstruction over the last 20 years, often more than once to the same country after successive disasters. The 1998 flooding of the Yangtze River in China was the most costly disaster of the year, claiming 4,150 lives, affecting 223 million people and causing \$30 billion in damage. (Data source: IDNDR web site)

In developed countries, the 1990s have seen an increase in the cost of natural disasters resulting from storms and floods. During 1989-90, a series of intense winter storms struck northern Europe causing over 200 deaths and billions of dollars in damage. In July 1996, a low-pressure system dumped 200mm of rain

in the Saguenay River region of Quebec in Canada and the resulting flash floods killed at least 10 people. Some 16,000 people had to be evacuated and losses were over US\$500 million. In 1998, the worst ice storm in the history of Canada caused wide spread havoc (Kerry et al 1999). In Canada alone it is estimated to have killed 25 people, and the present authors (Dore 1999; Dore and Etkin 2000) conservatively estimate the total social loss to exceed \$4.2 billion (1998 Canadian dollars). The 1998 El Niño was the most intense on record; it caused drought in Central Brazil, southern Africa and southern Asia and a record warm winter in Canada (Timmerman et al. 1999).

The 1990s was also the decade for disaster reduction, especially in the developing countries, and the UN General Assembly even established a special secretariat in Geneva called International Decade for Natural Disaster Reduction (the IDNDR). The mandate of that body has now come to an end. A new program called the International Strategy for Disaster Reduction (ISDR) will succeed it. The strategy was introduced at the final meeting of the IDNDR in July 1999, with the title 'A Safer World in the 21st Century: Disaster and Risk Reduction'.

The stated objective of ISDR is to enable communities to become resilient to natural hazards and to proceed 'from an approach of protection against hazards to the management of risk.' The strategy is structured around four main themes for action: public awareness; commitment by public authorities; disaster resilience; and the reduction of socio-economic loss.

It remains to be seen what the dimensions of disaster resilience will be defined to include, and how reductions in socio-economic losses will be achieved.

A recent initiative undertaken by the World Bank was the establishment of its 'Disaster Management Facility (DMF)' which was formed in July 1998 to provide operational support, promoting capacity-building, and establishing partnerships with the international and scientific community working on disaster issues.

The specific objectives of the DMF are to:

- improve management of vulnerability in risk-prone member countries and reduce vulnerability in the World Bank portfolio
- promote sustainable projects and initiatives that incorporate effective prevention and mitigation measures
- promote the inclusion of risk analysis and disaster prevention mechanisms in the World Bank operations, analysis and country assistant strategies
- promote training in the areas of disaster prevention, mitigation and response
- identify policy institutional and physical interventions aimed at reducing catastrophic losses from natural disasters through structural and non-structural measures, community involvement and partnerships with the private sector

In every region of World Bank involvement, lending in response to both sudden onset events such as earthquakes, floods and slow onset events such as droughts has increased greatly over the last decade to about \$8.8 billion. Statistics indicate that developing countries suffer the greatest when disaster hits. More than 95 percent of all deaths caused by disasters occur in developing countries. Losses due to natural disasters are 20 times greater (as a percent of GDP) in developing countries than in industrial countries.

Realizing the gravity of the problem of accelerating natural disasters in the 1990s, the World Bank announced yet another initiative. In February 2000, the World Bank and an international coalition of governments, international organisations, private insurance companies, universities, and non-governmental organisations launched a new international consortium, called ProVention Consortium, designed to reduce the human and economic costs of natural disasters in the developing world. The aim of the ProVention Consortium, will be to equip developing countries with the means to cope with natural disasters such as earthquakes, hurricanes and floods, and reduce the loss of life and property.

Thus the level and scale of natural disasters in the 1990s seems to have propelled the international community to undertake a number of initiatives, though we have not yet seen a dovetailing of these with global climate change policy. The Kyoto Protocol, the main standard bearer of action on climate change, remains unratified by most of the developed world, and the most recent meeting of the parties in Berlin (Conference of Parties 5, or COP 5) was a failure, as was COP 4 a year earlier in Argentina.

The Kyoto Protocol was signed under the 1992 UN Framework Convention for Climate Change (UN FCCC), but it looks increasingly as if the Protocol will lapse, unless serious action is taken particularly by the US to formulate a climate change policy that is consistent with the UN FCCC. In the meantime, most countries should be making preparations for *adaptation*, i.e. adapting to the inevitable climate change. Adaptation requires greater preparedness for more 'extreme weather and climate events.' As part of the preparedness, it is necessary to make policy makers aware of the *magnitude* of the social costs of such disasters. It is therefore essential that a consistent and systematic methodology for estimating social losses be developed and adopted by the community concerned with international climate policy and by the professionals involved with disaster preparedness.

Consequently the rest of this paper concentrates entirely on developing a consistent methodology for estimating the social losses associated with natural disasters. The next section comments on the methodology recommended by the National Research Council of the USA (NRC, 1999).

Cost estimation methodology of the US National Research Council

In 1996, FEMA commissioned a special report for assessing losses resulting from the impacts of natural disasters¹. For this purpose, a committee was set up drawing on the National Academy of Sciences, the National Academy of Engineering and the Institute of Medicine, with the National Research Council (NRC) serving as the main operating arm on behalf of the three bodies that administer the NRC.

In particular, FEMA asked the group to identify:

'the costs components that, when combined, would most accurately reflect the total cost of a natural disaster event. To the extent possible the committee will identify the relative importance of the components for accurate characterisation of an individual event and the significance of different components across the spectrum of hazards. The committee will also suggest possible sources for accurate cost information, regardless of whether data are generally available from these sources at present.'

The report of this committee was published as NRC, 1999. At the same time a second study entitled 'The Hidden Costs of Coastal Hazards: Implications for Risk Assessment and Mitigation' was prepared

by the Heinz Center. This study was published in November 1999 (Heinz Center, 1999). Space limitations do not permit comment on this study, which will be considered in another paper. This comment is confined to the NRC methodology.

The NRC Committee chose an arbitrary distinction between *Losses* and *Costs* that lacks rigor from the perspective of standard economic theory. It defines four concepts:

1. **Impacts:** It uses this as the broadest term, which includes 'market-based and non-market effects' (p. 3). It includes market-based impacts as... 'the destruction of property and a reduction in income and sales.' The non-market impacts include environmental damages and psychological distress associated with disasters. But it also suggests that some impacts could be 'positive', but that the net impacts of disasters would be 'predominantly undesirable' (p. 5).

2. **Losses:** The definition is worth quoting in full: 'The *losses* of disasters represent market-based negative economic impacts. These consist of direct losses that result from the physical destruction of buildings, crops, and natural resources and indirect losses that represent the consequences of that destruction, such as temporary unemployment and business interruption.'

3. **Costs:** 'The *costs* of disasters, as the term is conventional used, typically refers to cash payouts by insurers and governments to reimburse some (in certain cases all) of the losses suffered by individuals and business. Losses suffered by those who are uninsured, those whose losses do not make them eligible for insurance payments, and those who do not receive government relief should be counted in any complete compilation of the impacts of a disaster—but these losses are not included as 'costs', as that term is used in this report.'

4. **Damages:** 'The *damages* caused by disasters refer to the physical destruction, measured by physical indicators, such as the numbers of deaths and injuries or number of buildings destroyed. **When valued in money terms, damages become direct losses**' (p. 5).

These definitions are arbitrary; they are certainly not conventional in economics or even in accounting. In economics, one would be concerned with *social losses*, both *direct and indirect*. Social losses

Note

1. See also Howe and Cochrane 1993; Fairbairn 1996.

would reflect what society loses, and what would have to be *made up later, out of later production*. Payments made by the insurance industry are not social losses; the insurance companies have been paid insurance premia, and the payouts are disbursements from that accumulated fund. If it so happens that the disbursements exceed the accumulated fund, then that is due to an error on the part of insurance companies on assessing the actuarial risk (Etkin and White 1997). Therefore, if one is consistent with economic theory, social losses are what the NRC calls 'impacts.' And in the NRC report, costs refer only to 'cash payouts.' On the above definition, 'costs' is a subset of 'damages' which defines direct losses, as there will be many uninsured lives and many uninsured buildings. Thus direct damages may exceed costs.

Therefore one may ask: what does the concept of cost amount to in the NRC report? It amounts to a concept for which "forms" can be filled! Indeed, by their own admission the NRC committee's main contribution is their Table 2-2, on page

29, reproduced below. The report also contains 5 recommendations, but these deal with reporting and administrative mechanisms only.

It seems clear that the Committee did not deal with the responsibility that was assigned to it; that is, the formal charge which was 'to identify... the total cost of a natural disaster event...' (see the full quotation above). The committee was also asked to identify possible sources for accurate cost information, regardless of whether data are generally available from these sources at present. It does not seem that the Committee did that in the report.

One is led to the conclusion that the committee did not avail itself of the services of economists, and seemed mainly preoccupied with bureaucratic reporting procedures. In the next section, we outline an alternate methodology for estimating losses due to a natural disaster, which we applied to the 1998 Ice Storm in Canada.

An alternate methodology

In this section we develop a methodology

that is more in tune with economic theory and national macroeconomic accounts. The guiding principle should be an attempt to estimate the 'distortion' due to the disaster of the normal development and expansion path of the economy. Such an analysis is applicable, provided the disaster is marginal, or small in relation to the economy. It would not be applicable to large-scale disasters, such as the destruction of Thira, or the large-scale destruction of Germany or Japan in the Second World War. The essential criterion is the ability to get back to the previous growth path of the economy, projected a few periods forward. *Figure 1* shows that at time a disaster interrupts the growth of per capita real GDP. The question is: at time , what would it take to restore the economy so that per capita real GDP² at time would have been the same had the disaster **not** occurred at all.

In practice, the growth of per capita real GDP is never as smooth as that portrayed in *Figure 1*; recessions and other exogenous shocks make the curve 'jagged'. But even that is not a serious statistical problem, as one can fit several auto-regressive moving average (ARIMA) models and take the smallest or the average growth of per capital real GDP. (It should be noted that ARIMA is a sophisticated statistical technique that can forecast a nonlinear future path of a time series. It is now a standard tool used by economists and statisticians.)

The cost of the disaster in *Figure 1* is the loss of value-added over the period. But this value-added is made possible by using the physical and social capital and other infrastructure, which may itself be damaged or lost due to the disaster. When we take these into account, the total social loss can be resolved into:

- the loss of value added over the period due to the disaster³
- the loss of capital, destroyed due to the disaster
- the distortion of time allocation of personnel required in order to cope with the emergency
- secondary or indirect losses

Each of the above is discussed briefly below.

The loss of value-added

Value-added is defined as the sum of

Who Initially Bears the Loss		Insurers	Government ¹	Business	Individuals	NGO
Property:	Government					
	Structures					
	Content					
Business:	Structures					
	Content					
Residential:	Structures					
	Content					
	Landscape					
Autos, Boats, & planes						
Infrastructure:	Utilities					
	Transportation					
Agricultural products:	Crops					
	Livestock					
Human Losses:	Deaths					
	Injuries					
Cleanup and response costs ² -						
Adjustment Costs, temporary living aid ³						

Reproduction of Table 2-2: Sample Tada on Direct Impacts for Each 'Major' Event (dollar amounts should be entered in each cell in the table, except for human losses)

Note: If possible, direct primary and secondary losses should be tabulated separately

¹ Ideally losses of federal, state and local and tribal governments should be separately collected and recorded.

² Cost of added police protection immediately after the event.

³ Includes expenditure of charities such as the Red Cross.

Note

2. Ideally we need a some disaggregated or vector-valued Indicator of the standard of living. But in the absence of such an index, we can work with per capita real GDP.

3. As value-added is measured at market prices, the loss must include the loss of indirect taxes.

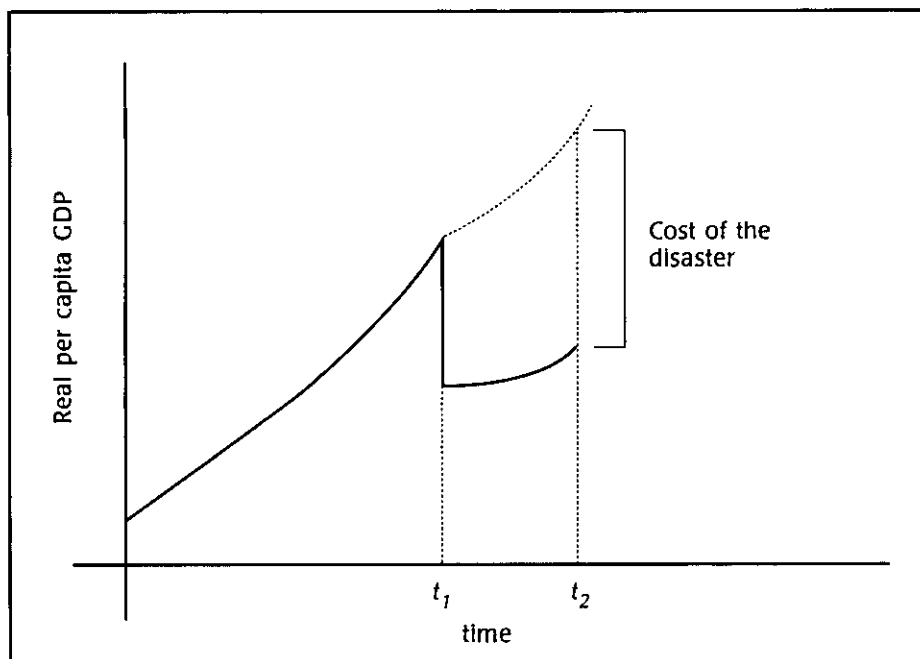


Figure 1. The economic cost of a natural disaster. Disaster occurs at time t_1 . Its duration is t_1 t_2 . The foregone growth is measured on the vertical axis.

wages, profits, interest, and rent, which is the sum of returns to all factors of production. For example, in the case of the ice storm, we would estimate the loss of value-added at firms and farms over the duration, until power was restored. It would include the value of milk wasted, but not the amount of cheese that was not made. At the cheese factory-level, only the loss of value-added (not including the milk as input) would be counted.

In the case of the ice storm, the loss of value-added affected the farm sector, the maple sugaring industry, forestry, manufacturing, construction, transport and communications, utilities, wholesale and retail trade, and the Finance, insurance and real estate sector. It should be noted that insurance claim payments made by the insurance industry are not 'losses' due to the ice storm. Insurance policy holders must have paid insurance premiums (over many years) to insurance companies and the claims are paid to policyholders as a result of valid insurance contracts. Such payments are neither 'costs' (incurred by the Finance, insurance and real estate sector) nor are they 'gains' or benefits⁴. However, when the losses are uninsured and the government steps in to compensate farmers or others with the use of tax dollars, it is legitimate to include that as part of the cost.

Note

4. The Conference Board study includes insurance claims as part of the total investment for reconstruction in the aftermath of the ice storm.

The loss of capital

The capital (destroyed as a result of the disaster) is that set of total assets that would permanently lower net value-added, unless it is replaced. The capital destroyed can be subdivided into:

- **Man-made private capital:** this includes buildings, machinery, factories and other capital equipment used by businesses. This category should include private houses, cars, trucks and tractors. For the farm sector it would include all livestock.
- **Man-made social capital:** this includes roads, bridges, ferries and all other public infrastructure including government real property.
- **Natural capital:** this is the valuation of all natural sites that can be said to have an economic or aesthetic value for which an economic return was previously possible. Thus forests, tourists sites, mountains and other natural beauty spots that are destroyed would be included here.
- **Human capital:** most disasters involve loss of human lives. In the case of trained and productive people, whose lives are lost, one must estimate their economic value, perhaps in terms of total income that they would have earned over their lifetime. Other lives, such as those of children and retired people may be more difficult. There is, however, a huge literature on the valuation of human life, and estimates vary between a negative value for a retired person (Henley and Spash, 1993)

to 3.84 million British Pounds, or about C\$8 million (Meng and Smith, 1990). There are also estimates produced for the US government, which put the value of a life around half a million US dollars. It should be noted that this is clearly a difficult value laden issue, since a retired person with a negative economic value may be priceless from other perspectives—to family, to society as a result of volunteer work, etc.

Distortion of time allocation

The loss due to time allocated for coping with a disaster is not included in the UN manual for the estimation of costs (UN ECLA, 1991, 1999). To our knowledge, such costs are not included in any of the other 'methodologies' of the assessment of economic costs of a disaster. This loss is the allocation of time and personnel of many agencies; it includes the costs incurred by the government disaster relief operations. It also includes the costs of charitable organisations (say, from Oxfam and Christian Aid), as well as those of international organisations such as UNICEF, Red Cross and Red Crescent, and other disaster relief agencies. One must also include the time of government personnel (e.g. the army, the civil service mobilized for a particular disaster), doctors, hospitals and of course the voluntary work of private citizens. All this is labour time allocated to dealing with the pressing problems. All such labour expended has an opportunity cost and must be included in the total loss due to the disaster. Even foregone leisure time has an opportunity cost and must be valued and its cost attributed to the particular disaster.

Secondary effects

The secondary effects of a disaster have their impact either on the *whole* economy or on areas *outside* the immediate disaster area. Consider first the areas outside the disaster area. For example, cheese factories outside the ice storm area that relied on milk from areas in Quebec would now have to obtain milk, at a higher cost, from other areas in Ontario or the USA. The higher cost of milk is an indirect (or secondary) effect. Consider another example: cheap hydro-electric power from the James Bay region in Quebec and from Churchill Falls in Labrador could not be obtained as the powerlines were down due to the ice storm. This might necessitate Atlantic Canada (i.e. parts not directly affected by the ice storm) having to import power from the South, from the USA at a high cost. The higher cost, i.e. the difference in the cost, is a secondary

effect. In the case of imports, the secondary impact is an unambiguous cost that can be attributed to the disaster. However when the indirect effect is a simple redistribution within a province or a country, then it would be inappropriate to include it as a cost. In that case the redistribution can be included only if distributional effects are explicitly and separately highlighted.

A disaster may sometimes affect the whole economy. In the case of Hurricane Mitch, it is very possible that tourist trade will be down for years as a number of holiday resorts were destroyed. This will also have balance of payment effects for Nicaragua and Honduras and parts of Mexico. The shortage of foreign exchange could affect other sectors within the economy and employment and sales will also be down as a result of Mitch. All such secondary effects must be carefully evaluated and their consequences traced. In the case of a shorter term and more localized disaster (such as the Oklahoma tornado) the secondary effects may be small; but in the case of Hurricane Mitch the secondary effects may be very large indeed (Pielke et al 1998).

Sometimes the secondary effects of a natural disaster can spread to many countries, and indeed sometimes to the whole world. The explosion of Mount Pinatubo in the Philippines reduced sunlight and lowered temperatures over the whole world. If ENSO is treated as a natural disaster, the 1998 ENSO has certainly some disastrous consequences for large parts of Latin American, Africa, Asia, the Pacific island states and Northern Australia. It brought an unusually cold winter to northern Europe but an unusually mild winter to North America. This is a natural phenomenon (a disaster) that had important redistributive consequences worldwide.

Conclusion

We have argued that the final decade of the last millennium was one of severe natural disasters, with most of them being weather- or climate- related. The international community has clearly recognized this fact and undertook a number of new initiatives such as the setting up of ISDR to succeed the IDNDR; the establishment of the Disaster Management Facility at the World Bank; and the setting up (in February 2000) of the ProVention Consortium. Whether or not global climate change diplomacy and international policy succeeds in dealing with the anthropocentric causes of global warming, it is apparent that nations must now

take steps to *adapt* to inevitable climate change (Munashinge et al. 1995).

In climate change science, there is a useful distinction between *mitigation* and *adaptation* (see IPCC, 1996). Mitigation is an attempt, through global diplomacy, to try to reduce greenhouse gas emissions and so to slow down climate change. On the other hand it is also recognized that the benefits of mitigation efforts will be felt very slowly, and may even be too late. For this reason, most countries are also planning for *adaptation to climate change*. It is for the development of adaptation policies that we need to be clear just exactly how much natural disasters cost. A prudent adaptation policy will require

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increased resilience to extreme weather and climate events, because it is through extreme events that climate change will manifest itself and have an impact on society. Extreme events can, and often do trigger disasters, and unless the true social costs of these disasters are known, policy makers will not appreciate the need to invest in adaptation measures. It is therefore imperative that a sound and consistent methodology for estimating the full costs of natural disasters is widely accepted and used. For this purpose, the cost method recommended by the US National Research Council (and accepted by FEMA) is inadequate. We propose a methodology, consistent with economic theory and macroeconomic accounts, be used for estimating the total social costs of natural disasters.

The policy implications of this paper are clear: extreme climate events are natural disasters, which cause damage to capital and infrastructure. A sensible adaptation policy requires preparing to make the capital stock and infrastructure resilient to such extreme events. But resilience will require investment and

new regulations such as new or improved building codes. The level of the necessary investment can only be determined if the social costs of disasters are known. However, estimating the social costs of disasters requires a consistent methodology.

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Using social indicators to measure community vulnerability to natural hazards

by David King and Colin MacGregor,
James Cook University

The information explosion and proliferation of powerful computers and software over the last decade or so has allowed more complex exploration of community vulnerability and its measurement. This has come about in two ways as a consequence of the technological revolution. Firstly, the measurement of the impact and occurrence of natural hazards has developed to a high level of prediction. Hazard-proof built structures and infrastructure have responded alongside this development in information and research. As the prediction of hazard impact and the establishment of safer building codes and warning systems have been improved, it has been the vulnerability of the human beings in the community that has emerged as the least known element. Thus, the second consequence of the information explosion has been emphasis on readily available information about the population. There are numerous social, economic and demographic characteristics available to measure the vulnerability of the community, but the problem in using them is how to isolate appropriate characteristics or variables as indicators of community vulnerability. The fact is that we are using this information regardless, because it is so easily available, and we are basing mitigation and emergency management decisions on the databases that we have constructed. The purpose of this paper is to reflect on some of the rules and limitations of using social vulnerability indicators.

The context of indicator research

Social indicators have been used since the 1960's to quantify social characteristics that could influence public policy (Neuman 1997). Expansion of the use of indicators resulted in a journal of Social Indicator Research. A few examples of uses of indicators span a wide range from basic socio-economic indicators (Choguill 1993), urban social patterns (Kloosterman 1996, Gentilli 1997), community medical needs (Mackebach 1992 and Mapelli 1993) and environmental sustainability (Fenton and MacGregor 1999).

In all of these examples of uses, indicators have been selected and then quantified in order to rank or classify spatial and social patterns.

Determining useful indicators is not an end in itself. Indicators are simply tools that can be used to define or point to a more significant issue. Indicators are selected from a greater mass of information about the population (in the case of socio-economic indicators). They may be developed from either primary (e.g. questionnaires) or secondary (e.g. Census) data sources. Characteristics of the population, such as age or occupation, for example, are summarised as individual variables, such as an age group or an occupation category. Certain of these variables may be selected as useful indicators of a particular construct (Neuman 1997, Sarantakos 1994). The construct that we are interested in is vulnerability of communities to natural hazards.

Constructs are concepts or ideas, very often abstract, that define or categorise an issue or situation. The construct is what we are really interested in. It is very often theoretical, being presented as a model that aims to express a relationship, or a process or an issue. Thus the construct is what we are researching, and the indicator must be its servant.

Principles for developing social indicators

Definitions of social indicators are often determined by the research disciplines in which the social indicator research is being undertaken. However, a generally accepted definition of a social indicator is given by Andrews and Withey (1976), who state that indicators:

'can be monitored over time...can be disaggregated to the level of the relevant social unit...The set of indicators should be 'limited' so that a substantial portion of the most salient or critical aspects of

society is included. They should be 'coherent' in that it would be helpful to our understanding if they hung together in some form that would eventually lead to a model or theory about how society operates'.

The Standing Committee on Agriculture and Resource Management (SCARM) also states that the selection of indicators, and in particular social indicators, should be grounded in a reasonable conceptual framework or model. To do otherwise is to simply revert to the selection of indicators on the basis of heuristics, the previous experience of the researcher, or 'what was thought important at the time' (Fenton and Macgregor 1999).

A review of social indicators undertaken by Fenton and MacGregor (1999) revealed five classes of indicators.

- *Informative indicators* (indicators used to describe the social system and the changes taking place e.g. social statistics subject to regular production as a time-series and which can be disaggregated by relevant variables)
- *Predictive indicators* (these indicators are informative indicators which fit into explicit formal models of sub-systems of the social system e.g. indicators such as family income and urban recreational facility location may be used in a model attempting to predict potential levels of juvenile crime in a neighbourhood)
- *Problem-oriented indicators* (these are indicators which point particularly toward policy situations and actions on specific social problems)
- *Program evaluation indicators* (indicators used to monitor the progress and effectiveness of particular policies)
- *Target delineation indicators* (variables describing the demographic, environmental, pathological or service provision characteristics which are useful in identifying geographical areas or population subgroups towards which policy is directed).

With suitable indicator selection, a model can be developed that provides clear directions for the development of specific policies. Indicators can be

selected with a variety of scales in mind, such as national, regional, local. The construct of intent determines the scale. Using the model together with socio-economic and socio-demographic data (such as those derived from the Australian Bureau of Statistics) it should enable extrapolation to other places, where an association has been demonstrated. In order to minimise measurement error it is also useful to use composite indicators. This means that rather than relying on a single indicator variable for a specific construct, construct validity can be improved by aggregating several indicator variables together, thereby yielding a composite indicator for a specific construct of interest (Fenton and Macgregor 1999). Usually this would require delivery of a reasonably high item reliability value as assessed through such indices as Cronbach's Alpha.

Developing useful social indicators

The Australian Bureau of Statistics (ABS) collects and examines a broad range of census data that can provide useful insights to community conditions. These include income, housing type and ownership, employment, crime rates, educational status, ethnicity, English proficiency, family structure to name but a few. One of the advantages of using indicators developed from such secondary data sources is that they are readily available and obtainable for a relatively small scale; the Census Collection District (CD). Simply combining the relevant CDs can then aggregate geographical areas, such as suburbs or whole towns.

The CD level aggregates all population and housing in the district. The Collection District is a block of streets in the city, or a subdivision, or outside the city a number of properties, farms or small communities. They are planned to contain approximately 200 households, which at a national/state average of just under 3 persons a household, is a population of about 600 people. As the 'workload' of one census collector, they also must have identifiable boundaries and should not change at every census, in order to facilitate the measurement of inter-censal change. Consequently Collection Districts are not homogeneous. Some are very small in population but cover an extensive area, some are in decline and others are expanding rapidly.

The Collection District therefore introduces an element of inaccuracy. Comparisons are constrained by unequal population sizes, and an aggregation that loses some of the precision and detail of

the diversity within the Collection District. However, for total figures of specific variables this is not too much of a problem. For example, the number of over 65 year olds living alone gives a precise figure for an area of a few streets. The data therefore provide an indicator of the likely needs for emergency service intervention.

When variables in the Collection District are modified in any way, such as a statistic as simple as a percentage, the lack of homogeneity becomes a more significant problem. The statistic may allow relative comparison of communities, but in being standardised it creates an impression of homogeneity. More sophisticated manipulation of the data exacerbates the distortion. On the other hand comparison of Collection Districts on the basis of whole numbers is accurate in terms of the concentration of the problem, but also distorts on the basis of population size. A vulnerability index is affected in this way because larger populations will drive the vulnerability analysis. The biggest Collection District will appear to have the biggest problem, when in fact the proportion, of for example, households without access to a car, may be sufficiently low that the general community is able to deal with its vulnerability without significant emergency service intervention. These issues of unequal population size and aggregation of characteristics underlie some of the statistical problems of using more sophisticated techniques to group data in order to generate a vulnerability index.

The ABS has used census variables in order to produce indexes of urban and rural socio-economic disadvantage, urban and rural socio-economic advantage, and economic resources, which especially stress educational and occupational characteristics. The indexes rank order census collection districts, but cannot be further quantified, although ranks can be aggregated into larger spatial units. Variables were identified through a process of common sense and relevance, using principal components analysis to group the variables. From these groupings, strong indicators could be selected and given a weighting in relation to their strength as indicators. The indicators that finally formed the indexes contained some aspects of wealth, especially income, rent and mortgage repayments, but family structures are not strongly represented and community facilities not included at all. The ABS claims strong comparability between the 1991 and 1996 censuses for over 77% of

collection districts, but because the index numbers are based on a ranked score, no quantification can be made between the rank in one census and the rank in another (McLennan 1998).

The resulting five Socio-Economic Indexes For Areas (SEIFA) are largely derived from different indicators (although indexes are not necessarily mutually exclusive of particular indicators). Consequently indexes that appear to be corollaries of one another may appear to be contradictory. For example the index of urban and rural socio-economic disadvantage is not necessarily the opposite of the index of urban and rural socio-economic advantage. Communities that rank highly on one index do not necessarily rank low on the apparent opposite. This is precisely the same with community vulnerability and resilience to natural hazards. In developing similar indexes of vulnerability for the Northern Beaches suburbs of Cairns, Melick (1996) found that there was no correlation between ranks on the vulnerability index and ranks on the resilience index. There are numerous reasons why an advantaged community is not necessarily the opposite of a disadvantaged one, and why vulnerability is not the opposite of resilience, but there is not space to address those issues here. More importantly this contradiction underscores the importance of only using a set of indicators for the single purpose for which they were selected.

However, it remains significant that when using census data the data is derived from virtually the entire population of the area in question so the representativeness of the sample population is extremely high. Census indicators go far in describing the socio-demographic and socio-economic conditions of towns or communities. Time series assessment of census data (i.e. considering changes in the data between census periods) can also help give some indication of trends but there is much that cannot be understood by examining such data alone. Time series cannot be used automatically (from the ABS Cdata census database) at the Collection District level, but only at SLA level or larger units, unless values are selected and added manually. Additionally, it is acknowledged that community life is more easily sustained when social networks are strong and there are people with common interests and who feel a sense of common future (Clark 1995; Berkowitz 1996). Assessment of these cannot be investigated by just examining census data (although correlations can be investigated). Unfortunately, many

communities do not have strong social networks and the members have little in common. Much of this discussion can be associated with the idea of 'sense of community'.

Clark (1995) offers some possible answers to this question when she emphasises that worldviews that promote a 'sense of belonging', by way of co-operation, neighbourliness, and unconditional acceptance, are those most likely to be more stable and to have lower levels of conflict. Such societies, she said, "usually offer members...physical and psychic security, sacred meaning and personal identity (Clark 1995:15). The concepts of cooperation, neighbourliness and acceptance (particularly ethnic acceptance) are all very important to northern Australian communities and can be measured using appropriate questionnaires. A sense of place and belonging is a very important aspect of community cohesion, and thus resilience to natural hazards. Berkowitz (1996) also notes the significance of levels of volunteerism and community participation, which he generally believes to be in decline. On a more political level, Berkowitz suggests that public money will be likely to diminish in the foreseeable future, ultimately forcing communities to rely more on their own local resources.

Attitudes as indicators of sustainability

A community's vulnerability or resilience to natural hazards can also be measured by the attitudes and values of its members. Rapport et al (1998) state that values can be considered as a set of philosophical, ethical, moral and emotional principles that order an individual or society. Rokeach (1973), however, points out that values and attitudes are significantly different. For example, he contends that a value is a single belief but an attitude is an organisation of beliefs about an attitude object. What is more, Rokeach argues that values drive motivation more strongly than attitudes. Despite the difficulties in clearly defining values and attitudes, it is none the less commonplace in social science to use attitude statements in questionnaires to determine an individual's value orientation.

The main purpose of developing a scale is to locate a person's attitudes to a particular object on an evaluative continuum, i.e. to determine how positive or negative those attitudes are. According to DeVaus (1985:83) a scale is 'a composite measure of a concept, a measure composed of information derived from several questions or indicators'. In

attitude measurement, the questions are usually in the form of statements to which respondents can offer an answer on a continuum of agreement-disagreement, but, because of the positivistic nature of attitudinal scales they allow comparison of attitude 'scores' between individuals or groups of individuals e.g. communities (Ponte 1997).

When it comes to attitude measurement, there are a number of different types of scale that may be drawn upon; for example, Thurstone's (1928) equal-appearing interval scales, Osgood *et al's* (1957) semantic differential scale and Guttman's (1950) scalogram. These all have qualities that are useful in a variety of ways. However, one of the most widely used scales in social science is the one developed by Likert (1932). This is very a simple method of summation using ratings for measuring attitudes, generally known as the Likert scale. The scales list a set of items that are designed to elicit attitudes towards a particular attitude object. Each statement is answered on a continuous (often a 5-point) scale so that each item will have a score depending on how it is answered. Unfortunately, such scales deliver ordinal data and a common criticism is that it is not possible to distinguish between the responses on the basis of size. Nevertheless, the technique is a common one and it is quite possible to design the questions in such a way that persons with different points of view will respond to the statements differently (Likert 1932).

As useful as attitude indicators are, they are not available from the census and can only be collected by carrying out time consuming and expensive social surveys. However, research carried out by Berry (1996) and Melick (1996) showed that positive attitudes and behaviour towards awareness and preparedness for cyclone impact were totally separate sets of vulnerability measurements that did not necessarily relate well to socio-economic indicators such as those derived from the ABS. It is also conceivable that an indicator item may be more relevant in one locality than in another. While geography seems likely to influence 'relevance', one can also expect the relevance of the various indicators to vary according to where a community is in terms of its cohesion and spirit.

Indicators of vulnerability to natural hazards

Indicators have been used throughout the last decade to assess the vulnerability of communities and populations to natural

hazards. There is a level of concurrence in the sorts of indicators that are appropriate. The socio-economic and demographic characteristics of vulnerability have been identified by Granger (1995), Smith (1994), Blaikie et al (1994) and Keys (1991) among others. The census provides thousands of such population variables, but there is a general group of vulnerability characteristics that are identified as particularly important. Table 1, summarises major groups that are agreed to be of significance as the sorts of people likely to be associated with high levels of vulnerability.

Specific groups of people may be identified as vulnerable, such as the elderly or single parent families, but the relative vulnerability of each is difficult to assess. Also an aggregation effect can occur as soon as more than one variable is selected, as several individual socio-economic characteristics may apply to one person or household; for example low income, single parent, lacking transport, poorly educated etc. At this time there is no rank or measure of sensitivity of each variable (Keys 1991, Granger 1995, Buckle 1995, Smith 1994). However, Granger (1999) has gone on in the multi hazard risk assessments of Cairns and Mackay to integrate social indicators with more easily identifiable physical and infrastructural facilities in the community.

Constructs and models

In reviewing how other researchers are using indicators, the most important message is that they must serve the needs of the research question. This is formulated as a construct, or a model or a theoretical framework. All uses of indicators are examining some kind of construct. The indicator is a tool. Before

<p>The very young The very old The disabled Single parent households One person households Newcomers to the community and migrants People lacking communication and language skills Low income earners</p> <p>Source: Keys 1991, Saller 1995, Blaikie et al 1994, Buckle 1995, Smith 1995, Granger 1993, 1995</p>
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Table 1: significant socio-economic and demographic characteristics

social data became easily available, as recently as the 1990's, social indicators, even from the census, had to be painstakingly assembled. Researchers were consequently sparing in their use of the data and used small numbers of indicators. It is now possible to assemble enormous numbers of indicators for extensive areas, and carry out very powerful statistical techniques quite painlessly. One of the drawbacks of this is that it is too easy to randomly select sets of indicators, or to allow the indicators to drive the model. As empirical research this can sometimes be useful, but there is a great difference between exploratory use of indicators to identify patterns and relationships, and the selection of appropriate indicators to define the model that may have been developed, at least in part, from initial exploratory research.

Earlier assessments of vulnerability (Keys 1991, Salter 1995, Blaikie et al 1994, Buckle 1995, Smith 1995, Granger 1993, 1995) have already listed groups of characteristics as in *Table 1*. The problem in using indicators to predict the vulnerability of actual communities is that as we add or subtract indicators from the list the vulnerability ranking for any given community changes (Melick 1996). The ABS SEIFA indexes are standardised sets of weighted indicators. It is appropriate that the same standardisation could be applied to measuring community vulnerability. If the same indicators are used every time, comparability between areas and even times, becomes more realistic. For this to be appropriate though, the theoretical construct needs to be both defined and universally accepted.

The basic risk equation is a theoretical framework which, modified by Granger (1999) contains three sets of constructs.

$$\text{risk} = \text{hazard} \times \text{elements at risk} \times \text{vulnerability}$$

Hazards are increasingly quantifiable and accurately predicted, and the elements at risk are relatively easily quantifiable (although data gathering may be expensive) as they consist of buildings, infrastructure and facilities etc. Vulnerability remains the most difficult to quantify and relies heavily on indicators from available mass data such as the census.

Community vulnerability is also an extremely complex concept. For a start vulnerability includes resilience and the ability to recover from a disaster, both as a corollary and as a parallel of vulnerability. As with the SEIFA indexes, each construct needs its own set of

overlapping indicators. For example we would include low income households as an indicator of vulnerability and high income households as an indicator of resilience, and yet probably rank trades occupations etc. as more important for resilience than highly paid, yet less 'practical' occupations. People with very different occupations may be equally resilient in totally different situations. Many indicators can be criticised in this way because they are only single characteristics of complex individuals.

Community vulnerability and community resilience then further divide into things about the population that make them vulnerable—the classical social, economic and demographic characteristics—and attitudes, behaviour and values. Each of these elements becomes a separate construct that is indicated by very different sets of indicators.

Researchers such as Buckle (1995, 1999) have examined the complexity of communities as overlapping networks that transcend spatial boundaries. Rhodes and Reinholdt (1998) proposed a vulnerability model based on the fire hazard. It contains some indicators that are different to those we might select for flood or cyclone hazards. However, it is interesting in separating vulnerability into three groups of indicators—reduced response capacity, increased fire risk, and circumstances contributing to the victim's response

being ineffective—that feed into high risk groups, that are in themselves defined by specific indicators.

Community capability and vulnerability

If we want to know how vulnerable a community is we must begin with some level of expectation of what is required of the community in the face of a hazard. Zamecka and Buchanan (1999) list many expectations of what is required to mitigate against a disaster, by addressing needs such as insurance, community relationships, awareness, preparation, training, recovery, housing, planning laws and many more. As an example we could list the required behaviour and characteristics of a community in order to minimise vulnerability and maximise resilience. These could be listed as ability and willingness to evacuate, ability to protect home and property, having insurance, substantial structures, involvement with community and neighbours and family, having good mental and physical health, no dependency and no dependants, an ability to access warnings, instruction and advice, general and local knowledge, commonsense and caution, and youthfulness.

These characteristics could lead to an ability on the part of a community and its members to assess the acceptability or otherwise of the risk and their ability to

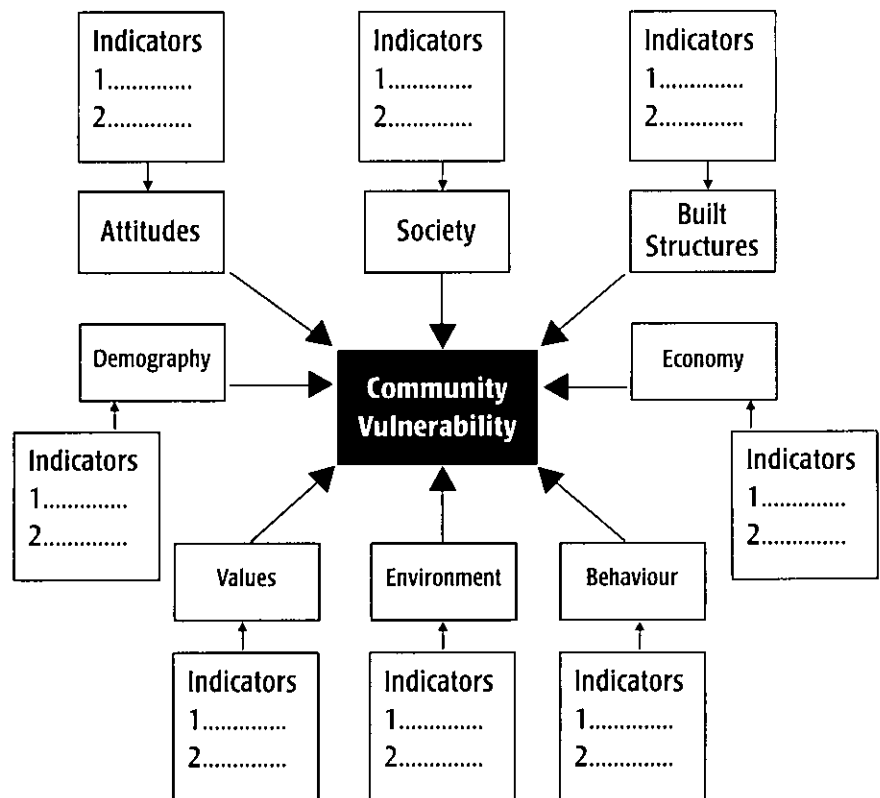


Figure 1: links between indicators, constructs and models

recover from a disaster. We could go on adding to a list of required behaviour, but related groups of characteristics would be repeated. The community can instead be divided up into a matrix of components. On this matrix we can insert individual indicators, or as in *Table 2*, the source of such indicators.

Census data are readily and cheaply available. All three of the other components of community may only be measured by carrying out targeted surveys and interviews. However, community networks and values can be ascertained to some extent by textual research (Gephart 1993) of papers, newsletters and community publications, and by understanding the constraints of social groups and the local political economy (Mustafa 1998). We do the latter categorisation by referring to 'working class suburbs', 'snob hills' or 'nappy valleys' and so on. Whole sets of community value assumptions flow from our social classifications of communities.

Thus the problem facing local and state emergency managers in measuring vulnerability is that significant elements of community vulnerability are not measurable without undertaking costly and time consuming household surveys. The census remains the primary source of easily available social indicators. In carrying out the multi hazard risk assessments in Queensland, Granger has made extensive use of census indicators based on analysis of the literature. His list of indicators has been refined as the studies have developed, but most importantly the indicators are grounded firmly in a model of vulnerability. Five elements of vulnerability are identified as the setting, shelter, sustenance, security and society. The setting is primarily made up of indicators that reflect external factors

of the place and its infrastructure, but population variables such as total population, density and the sex ratio (because this indicates special purpose institutions like nursing homes and boarding schools) were incorporated. Shelter is primarily concerned with indicators of the structures and uses census indicators on houses and population to calculate ratios such as occupancy and uses census data to derive indicators on vehicle ownership. Sustenance is entirely concerned with lifelines and logistics. Security is concerned with community health, welfare and economy, alongside safety. Social indicators derived from the census include SEIFA indexes as individual indicators, demographic groups and things like renting and unemployment rates. Thus the society element which is primarily concerned with characteristics of the community and its members, is only one of the elements to use census derived indicators.

By combining the physical elements at risk with social and community vulnerability, into an interlinked set of five elements of vulnerability, Granger (2000) has established a carefully constructed model of indicators that are both physical and social, and composites of both. The advantage of this model for emergency managers is that it utilises easily available data. It is made up of information that should be in the disaster plan, plus the five yearly census.

The selection of the social indicators is based on the definitions of the elements of vulnerability in the model. Thus rather than debate the pros and cons of different variables, or attempt to weight some of the indicators, which we know will change the ranking of individual communities, it is worthwhile refining the Granger model towards adoption as a

standard for measuring vulnerability. If we use a standard in all locations as a basis for vulnerability to multiple hazards, measurements can be recalculated and added to relatively easily, thereby maintaining a continually available classification of community vulnerability for all communities.

Conclusion

There are considerable complications and constraints surrounding the use of social indicators in measuring community vulnerability to natural hazards. Despite that, many types of indicators are readily available for use by emergency managers and councils. Therefore there are three basic conclusions that need stating. Firstly social indicators should not be developed without a theoretical model or construct. The idea must be defined and created first with the indicators selected as tools to serve the model. Secondly it is possible to generate a standardised working model that relies on a fixed set of tested indicators. Thirdly, such a model of vulnerability will necessarily be based upon existing data that can easily be updated. Inevitably this type of model will exclude the extremely important components of vulnerability that are encapsulated in awareness and preparedness. Surveys that ascertain people's attitudes and behaviour cannot be carried out by every council, and besides these should also be relatively standardised. However, it remains critically important to continue researching these components so that the relationship between a model of community vulnerability based on social and built structure indicators, can be linked to awareness and preparedness, and critical indicators developed that may be used to modify or qualify the model.

	Population Characteristics	Hazard Attitudes	Behaviour & Preparation	Community & Values
Individuals	Census	Quantitative Survey	Quantitative & Post Disaster Surveys	Qualitative research
Family/ Household	Census	Quantitative Survey	Quantitative & Post Disaster Surveys	Qualitative research
Community	Census	Quantitative Survey	Quantitative & Post Disaster Surveys	Qualitative research

Table 2: components of community and sources of indicators

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Announcement

Combined Emergency Services
Seminar Committee

22nd Annual Seminar:

**'Preparing for Emergencies
Today'**

Undercroft Theatre, La Trobe University
Saturday, November 25.

- A one day presentation of papers including:
- Severe Weather Predictions - Bureau of Meteorology
 - Canine Search & Rescue - Australian/Swiss Search Dogs Association & VICSES
 - Emergency Medical Response - M.F.E.S.B.
 - The Unlikely Event, possible effects of a major Dam failure - Richard Scott VICSES (Rtd.)
 - International Exchange, C.F.A. - S.E.S. overseas experience.
 - Industry & the Local Community.

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Public health impact of disasters

Introduction

Each year millions of people are affected by natural and manmade disasters around the world. 1999 was an example of the devastation that natural hazards can have on humanity. Tornados, hurricanes, heavy rains, and earthquakes resulted in tens of thousands of deaths and many more affected. Close to a million people have found themselves homeless, economically impacted, or injured because of these disasters. Indeed, disasters would not be 'disastrous' if it were not for their effect on the human population. While disasters cause problems that exact a human toll and are amenable to public health interventions, the application of public health principles to disaster management has been minimal. This paper explores the public health effects of natural disasters and some of the public health principles which can be applied to disaster management.

The impact of natural hazards on the public's health can be divided into four categories:

- direct impact on the health of the population
- direct impact on the health care system
- indirect effects on the population's health
- indirect effects on the health care system.

Direct impact on the health of a population

The most obvious impact on the health of a population affected by a disaster is that of injuries and deaths that can be attributed directly to the disaster. Each year, approximately 300 natural disasters occur worldwide, exacting a human toll of approximately 250,000 lives. In the past 20 years, natural disasters have claimed the lives of close to 3 million people and have negatively affected the lives of at least 800 million more (Noji 1997).

Injuries

Different types of disasters result in different patterns of injury and these, in turn, produce variable levels of morbidity and mortality. Generally it is believed that earthquakes and rapid flooding (i.e. tsunamis and flash floods) are capable of producing large numbers of deaths. Earthquakes and high wind events (such as tornados) are capable of producing large numbers of severe injuries requiring intensive care (Noji 1997). These

By Kimberley I. Shoaf, DrPH & Steven J. Rottman, MD, FACEP, UCLA Center for Public Health and Disaster Relief

relationships are not linear, however. For example, not all earthquakes result in large numbers of injuries or deaths and hurricanes can, in fact, result in large numbers of fatalities.

Tropical storms and hurricanes

The number of fatalities associated with hurricanes in the western hemisphere have decreased dramatically with the advent of improved storm tracking and the issuance of hurricane warnings. Hurricane Mitch, however, provided a stark reminder that hurricanes remain a significant threat to life in that region of the globe. In October 1998, Hurricane Mitch devastated Central America. Even though the hurricane had been tracked, warnings were not issued to the population (Corrales 1999). In Honduras alone, 8000 people were killed as a result of flooding and landslides. The pattern of the injuries and deaths associated with Hurricane Mitch was also different from other hurricanes. Generally hurricane-related mortality has principally been associated with drowning from storm surges (Noji 1997). But a large number of the Hurricane Mitch fatalities were associated with inland flooding and mudflows resulting from 5 days of torrential storms leaving behind 30 inches of rain (PAHO 1999). The sustained high winds associated with these storms also have the potential of causing blunt trauma from flying debris as well as from structural collapse of buildings. Several deaths in Hurricane Andrew in South Florida in 1992 were attributed to the high winds associated with that storm (Noji 1997).

Earthquakes

Injuries and the resulting fatalities associated with earthquakes vary tremendously from one event to the next. Both the number and severity of injuries are related to a number of factors including the magnitude of the earthquake, its proximity to a populated area, the soil type, building construction, time of day and population characteristics and behaviors. While there are a large number of factors

associated with the impact of earthquakes on human health, a key factor associated with fatal injuries in earthquakes is building collapse.

Earthquakes in which a large number of buildings collapse result in many more deaths than those where there is minimal collapse. Building collapse is correlated with the magnitude of the event, its proximity to the building, soil conditions, and the construction practices utilized (Bourque 1998). The combination of a large earthquake, in close proximity to a population center, built upon soft soil, using construction practices which do not employ anti-seismic reinforcements, can result in unimaginably large number of fatalities.

The 1999 earthquake in Turkey is an example of the potential that earthquakes have for death and destruction. A magnitude 7.4 earthquake occurred on the North Anatolian Fault, near the town of Gölcük on August 17, 1999. Hundreds of apartment buildings, constructed out of reinforced concrete collapsed on their sleeping occupants. The results were an estimated 17,000 deaths with an additional 10,000 people missing and presumed dead. Another 24,000 individuals were treated for injuries (MMWR1999). An earthquake of similar magnitude occurred a month later in Taiwan. The 7.6 Mw earthquake also struck in the middle of the night killing approximately 2400 people. While as many as 5000 buildings reportedly collapsed in Taiwan, many of them were non-engineered low-rise buildings as compared to the reinforced concrete buildings in Turkey which were more deadly (Goltz 1999).

Even a relatively small earthquake can have devastating effects. On January 25, 1999 a magnitude 5.9 earthquake occurred in the coffee growing region of Colombia. The relatively moderate earthquake however struck an area that had soil conditions which exacerbated the shaking experienced in the city of Armenia. The construction practices prevalent in building in the region did not include any codes for anti-seismic reinforcement until 1986. As a result of the earthquake, hundreds of reinforced concrete buildings collapsed, killing nearly one out of every 250 people in this community of 250,000 (Shoaf 2000).

The force of the earthquake is not the only cause of death. Secondary hazards

such as firestorms and tsunamis can also wreak havoc and a high death toll. It is estimated that as many as 10% of the deaths in the Kobe earthquake were a result of the fires that ignited from ruptured gas lines. Rubble in the narrow streets restricted the fire department's access to the fire, allowing it to spread across large sections of the city.

In 1998 a magnitude 7.0 earthquake struck off the coast of Papua New Guinea. While the quake was felt, it did no damage to the small houses in the villages off the coast. However, 15 minutes later three tsunamis struck the coastal villages. It is estimated that as many as 3000 of the 8000 inhabitants of the region died as a result of the waves, which exceeded 12 meters (USC 1998). Many of these deaths were a result of the force of such a large amount of water surging against the body. For those who survived the force, many drowned, as they were unable to swim.

Non-fatal injuries also vary in severity and number and are dependent on a number of variables. Unlike fatalities the critical factor is not necessarily building collapse or even damage to structures. Non-fatal injuries can range from very minor injuries such as lacerations and injuries to soft tissue to such life-threatening injuries as trauma to internal organs. Whereas fatal injuries are usually caused by building damage, these non-fatal injuries appear to be more directly associated with ground shaking. The Northridge earthquake of 1994 provides an example of this. Whereas a majority of deaths occurred in collapsed buildings, most non-fatal injuries (both those who were hospitalised and those who sought treatment elsewhere) were more associated with non-structural responses to ground shaking. The two major causes of non-fatal injuries were being struck by objects (or running into them) and falls (Peek-Asa et al. 1998, Shoaf et al. 1998).

Communicable diseases

Many believe that the primary role of public health in disasters is to control potential communicable disease outbreaks after a disaster. While it is true that the potential for outbreaks and even epidemics of infectious disease exists after any natural disaster, the actual occurrence of such outbreaks has been rare (Noji 1997). In order for the risk of epidemic to exist, the disease of concern needs to exist in the population prior to the disaster.

Following the earthquake in Turkey in October 1999, there was a great deal of speculation that outbreaks of cholera and

typhoid would occur as a result of the large number of dead bodies. While there are sporadic cases of typhoid in Turkey it is not a disease that is common there. One individual was treated for typhoid by emergency medical personnel following the earthquake, although the case was not confirmed as typhoid and the source of contagion was not identified. A single case of typhoid in an area where sporadic cases exist is not an outbreak. However, that case fueled a great deal of commotion in the media and the public health community. Dr. Claude deVille de Goyet of the Pan-American Health Organization wrote an op-ed piece for the *New York Times*, which unfortunately was not carried. In that piece, Dr. de Goyet talked about the myth that disasters result in epidemics of infectious diseases and emphasized instead the need for maintenance and quick restoration of sanitary services and potable water to the affected population, as well as surveillance of its health status. Dr. de Goyet also admonished post-disaster efforts aimed both at the quick disposal of bodies as a public health measure, as well as large immunisation campaigns geared to counter epidemics of specific infectious diseases that simply do not occur following these incidents.

A more accurate reflection of how well a community can withstand the adverse health effects caused by a disaster may be found in the strength of the public health system in place prior to the disaster. Consider the occurrence of dengue fever following both Hurricane Mitch in Honduras and the earthquake in Colombia.

Honduras has a public health system which is making great strides in improving the health situation for its population. In the last 10 years, both maternal mortality and infant mortality have decreased steadily in Honduras. However, infectious diseases continue to be the principal reason for medical care and hospital admission and represent six of the top ten causes of death in the country (PAHO 1998). In Colombia, the public health situation also has improved, yet infectious diseases still represent one of the principal reasons for medical care and are one of the top five causes of death (Shoaf 2000).

Both Colombia and Honduras are endemic regions for dengue fever; in 1998 in fact, Armenia, Colombia had an epidemic. Both the Colombian earthquake and the Honduran hurricane produced conditions that could increase the vector, flies, which carry dengue. Since the impacted area in Colombia was

smaller the ability to provide vector control in the region was greater. Surveillance in Colombia demonstrated that there was no increase in either classic or hemorrhagic dengue fever. Surveillance in Honduras however, demonstrated a bimodal increase in cases of dengue: a small increase immediately following the hurricane and a second increase in January, 1999. The destruction of the transportation and health care sectors from massive flooding made it more difficult for the health care sector to respond to a disaster of such magnitude. While Colombia's public health infrastructure was most likely a contributing factor in the absence of post-earthquake disease outbreaks, a disaster may increase the demands on an already weak public health infrastructure in developing countries. This may result in a shift in priorities away from building communicable disease prevention and control programs in non-disaster times, to more urgent efforts to respond to a legitimate increase in cases when a disaster occurs (Richman 1993).

No outbreaks of infectious disease, such as dengue, have been reported following similar disasters in the United States or other developed countries. This is simply because infectious diseases do not represent major causes of illness or death in the United States. While dengue fever is a possibility in parts of the United States, particularly southern Florida, because the occurrence rate is small, any outbreak detected by surveillance would most likely also be small and not expected to be a large additional burden on a public health system that is trying to provide basic necessities in response to a disaster.

Acute illnesses

In contrast to infectious diseases, disasters do have the potential for other types of short-term impact on the population's health. Some disasters have the potential for directly or indirectly causing acute illnesses in an exposed population. Earthquakes, for example, can cause the release of soil containing spores, such as *coccidioides immitis*, causing clinical coccidioidomycosis. This occurred following the Northridge, CA earthquake of 1994 causing a small outbreak of coccidioidomycosis in a community in Southern Ventura County. Other natural hazards that have the potential of causing acute illness include volcanoes and wildfires which can cause both respiratory and ocular problems as a result of ash, smoke, and toxic gases.

Extreme weather conditions are good

examples of natural hazards which have the potential for both direct and indirect acute health consequences. In the United States in the recent past, increases in morbidity and mortality as a direct result from heat waves have been documented. In Chicago in the summer of 1995, 465 people died from heat-related illness when record-breaking temperatures were recorded for 8 consecutive days (MMWR 1995). Those most at risk were those who were elderly and either did not have, or did not turn on, air conditioning in their homes.

At the opposite extreme hypothermia is only one potential acute health problem associated with extreme cold weather. Extreme cold weather events are also accompanied by two secondary hazards which carry their own adverse health effects. Extreme cold events, especially those that result in ice storms, often result in electrical power outages. In response to the lack of electricity, residents commonly resort to using candles for light and kerosene heaters and fireplaces for heating. This use of open-flame sources has been associated with residential fires, and fire-related mortality. Power failures also result in residents using gasoline or kerosene powered generators. The misuse of generators in poorly ventilated settings is associated with an increase in carbon monoxide poisoning (MMWR 1998).

Chronic illnesses

The consequences of a disaster on the health of the population are not limited to acute conditions such as physical injuries or acute illness. For a long time there has been speculation that disasters result in an increase in adverse consequences of chronic illness such as heart disease. Anecdotal accounts of disasters often include reports of increased heart attack deaths, especially in the event of acute onset disasters such as earthquakes. Certainly heart attack deaths are often included in the official numbers of fatalities in disasters. In the Northridge, Californian earthquake, the official coroner's report of the fatalities directly or indirectly associated with the earthquake was 57. Only 33 of those deaths were as a result of physical injuries (Peek-Asa et al. 1999). The other deaths were attributed to heart attacks or other medical causes. These numbers, however, did not include all individuals who died of heart attacks in Los Angeles County on January 17, 1994, but only those coronary deaths that came to the attention of the coroner and were determined to be somehow caused or hastened because of

the earthquake. A study of the fatal coronary events in Los Angeles found that indeed there was an increase in the number of heart attacks on January 17, 1994 however, a decrease of fatal events occurred in the following week (Kloner et al. 1997). Thus, it appears that an acute disaster such as an earthquake may hasten death from heart attack, however, the net effect is not a significant increase in fatal heart attacks.

While disasters may not be associated with a large increase in fatal acute coronary events, they do appear to result in greater morbidity from chronic conditions such as heart disease, hypertension and diabetes. Researchers in Japan found that glycemic control was impaired in diabetics following the Kobe earthquake (Inui et al. 1998). Similarly, following Hurricane Iniki on the Island of Kuai in Hawaii, the mortality rate from diabetes doubled compared to prior to the Hurricane (Hendrickson and Vogt 1996). Therefore, conditions for which stress is a risk factor and for which ongoing health care is necessary appear to be affected by disaster situations.

Psychological effects

The health effects of natural disasters are not purely of a physical nature. A great deal of literature deals with the emotional or psychological effects of disasters. Just like the physical effects, the emotional effects of disasters vary greatly from disaster to disaster. They also tend to range from very minor emotional distress to clinically diagnosable psychological pathology. Again there are a number of variables that contribute both to the severity and extent of the psychological effects. Generally, natural disasters result in large numbers of individuals suffering from minor emotional distress that tends to be self-limiting in nature (Bravo et al. 1990). Some portion of the population may suffer from more severe forms of distress, especially anxiety and depression, depending on their prior psychological state and the impact of the disaster on them and their families (Siegel 1999). While it has generally been believed that victims of natural disasters suffer from Post-Traumatic Stress disorder (PTSD), it does not appear that this is the case. Symptoms of PTSD may be expressed by victims of natural disasters but community based studies do not reflect an increase in diagnosable PTSD (Siegel 2000).

Direct system effects

Hospitals, clinics, health care centers and the personnel that staff them are subject to the same destructive forces as

are other buildings and people in the area of a disaster. This damage occurs at a most inopportune time, just as the need for emergency health care is greatest.

Damage to the physical infrastructure

An example of the direct impact of disasters on the health care system was the damage to hospitals as a result of the Northridge earthquake. Eighteen hospitals suffered varying degrees of structural and/or non-structural damage as a result of the earthquake. Several hospitals had to evacuate patients already there and others were unable to treat individuals seeking emergency care (Cheu 1995).

The earthquake of January 25, 1999 in the coffee region of Colombia had similar devastating impacts on the health care system. The one hospital in the community of Calarca suffered significant damage to the building, causing the evacuation of the 30 in-patients to a building next door. Although the damage did not affect the integrity of the building, stairwells were impassable and significant damage to walls in the operating suite made those areas unusable. The hospital continued to provide emergency care in the portion of the building that had been constructed after a previous damaging earthquake. This section fared much better than the older sections of the hospital, which had significant portions built of unreinforced concrete.

A number of clinics in Armenia also suffered major structural damage. Of the 12 public health clinics in the city, four collapsed in the original earthquake with five others having significant damage to the roof, walls, and equipment. One clinic slowly slipped down the hillside behind it, although it had continued to function in the immediate aftermath of the earthquake.

The effects on the health care system are not only a result of structural damage. A major cause of damage to hospitals in the Northridge, Californian earthquake, was breakage of water lines and sprinkler pipes. Many hospitals, although structurally sound were unable to operate because of the damage caused by water pipes rupturing and flooding the facility causing a loss of medical records, medical supplies, computers and other electronic equipment (Cheu 1995). The Sepulveda Veteran's Administration had such extensive damage due to water that they were forced to evacuate their patients to other area hospitals in spite of the fact that they sustained no structural damage to the hospital.

Other non-structural damage also

affects the ability of health care agencies to provide services after disasters. Forces from earthquakes, tornados and hurricanes can damage both supplies and equipment as they fall to the ground or have other things thrown on top of them. The destruction of equipment and supplies, especially the loss of laboratory functions and pharmaceuticals, places an additional burden on a health care agency trying to provide services to an increased number of patients. Likewise, the loss of medical records can place an additional burden on the system.

Loss of personnel

In addition to the buildings having the potential to be affected by the disaster, the personnel required to keep the health care system functioning can also be victims of the disaster. When a disaster strikes a region, those who provide health care can be injured, lose family members, or have significant damage to their residences. Even if they are physically able to report for duty there may be significant emotional issues for them to deal with. There is a need for them to know that their family members are alright. They will also need time to return their homes to order as well. This need for time off comes just as the need to provide health care services often exceed the capabilities of a fully functioning health care system.

Indirect impact on the population

In addition to the direct health impacts that disasters have on a population's health there are indirect effects. These effects result partly from the loss of routine health care as a result of both damage to the health care system and the overloading of the system with trauma-related care.

Loss of primary health care

Damage to the health care system can have a significant impact on the health of the population in the area of a natural disaster. In addition to urgent health care needs generated by the disaster populations have baseline conditions which do not end because a disaster has occurred. There are primary health care needs which, if not met, will adversely affect the population. Immunisations, prenatal care, management of chronic medical conditions such as hypertension, diabetes and cardiac disease, as well as other primary health care services need to be maintained and provided to the affected population.

There are also members of each community who have special health care needs. In one study of Los Angeles County residents it was found that approximately

21% of households in the County have at least one member who uses prescription medications (Sareen et al. 1998). If pharmaceutical services are interrupted where will these prescriptions be refilled?

Loss of normal living conditions

Disasters have the potential to economically impact both the community as a whole as well as individuals and families. The Northridge earthquake has been the costliest natural disaster in American history. Some estimate that the cost of this earthquake has exceeded 42 billion dollars (Eguchi et al. 1998). This estimate does not include the potential economic impact of business failure because of the inability to recover from the damages of the earthquake. This economic loss is borne not only by the government and business, but also by individuals and families. While research seems to indicate that most victims of disasters in the United States eventually recover and return to their original living conditions it also indicates that recovery is neither rapid nor definite. Some sectors of the population seem to be able to recover more quickly and more fully than others (Bolin 1993). Those who have excess resources may be able to invest those resources in recovery.

Those who depend on outside assistance may find that the recovery process is longer and more difficult. In addition, those members of society who are marginalised, because of economic status, language barriers, age, infirmity, or belonging to a minority group, may also find it more difficult to access needed services to achieve recovery. In the meantime those who have not yet recovered often live in sub-optimal circumstances. An example of this was demonstrated following the Kobe earthquake of 1995. A great deal of recovery occurred in that city very rapidly following a devastating earthquake. When one of the authors visited Kobe in 1997, many of those affected by the earthquake had already repaired or rebuilt their homes. Most of the temporary living quarters were shut down as residents returned to a more normal lifestyle. However, there were still a number of people living in temporary settlements far from their neighborhoods. These temporary settlements were communities of prefabricated housing that had one small bedroom, cooking facilities and a small bath. Laundry facilities were available on the outside of the units. While most Japanese homes are small these residences were even smaller than average. These communities were not inhabited

by a cross-section of the population. The majority of the residents were elderly individuals and couples. Most had rented their homes prior to the earthquake and were waiting for the construction of new apartment buildings so they could return to a more normal lifestyle.

Role of disaster assistance

The receipt of disaster assistance has been tied to long-term health outcomes. Melkonian (1997) found, in a prospective study of employees of the Ministry of Health who lived in the area of the 1989 Spitak, Armenia earthquake, that receipt of disaster assistance was related to health care outcomes not normally considered as 'disaster-related' such as the three medical conditions mentioned above: diabetes, cardiovascular heart disease and hypertension. He found that while exposure to disaster-related stressors (ie. damage to home, injury to self, or injury/death of family member) was only weakly related to health care outcomes, receipt of disaster assistance specified the relationship (Melkonian 1997). In other words, those individuals who had high levels of disaster stressors had significantly lower levels of disease in the two years following the earthquake if they received disaster assistance. Disaster assistance however had no effect on the level of disease for those who had low levels of earthquake-induced stressors.

Indirect impacts on the health care system

Disasters also indirectly impact the health care system just as they indirectly affect the population. The indirect impacts result from increased usage of the system and from impacts on the infrastructure upon which the health care system relies.

External infrastructure damage

'Even when they are not impacted directly, individuals and businesses may be affected for an extended period through damage to lifelines such as water supply or roads' (Cole 1995). Certainly the health care sector, like the business sector, must rely on the external infrastructure for normal functioning. On a day to day basis the health care sector depends upon the utilities to provide electricity, water, natural gas, and telecommunications. An effective emergency medical system (EMS) is dependent upon a transportation sector that maintains adequate roads and highways.

All natural disasters have the potential for inflicting serious damage on the lifelines upon which the health care sector depends. The utilities are at risk for

downed power and telecommunication lines, over-turned or cracked transformers, and system overloads from earthquakes, windstorms, hurricanes, ice storms and other natural hazards. Underground pipes carrying water, sewage, oil, or natural gas are at risk for breakage from earthquakes. Water treatment systems can be overwhelmed by large amounts of water from hurricanes and other flooding events. Without these utilities the health care system cannot function.

Large health care agencies, such as hospitals, often maintain back-up systems in case of failure of the infrastructure. Hospitals maintain emergency generators and have some water storage capabilities. However, these back-up systems do not always function as expected and are by their nature limited resources to be used for a short period of time. Also, other essential components of the health care system often do not have such back-up systems. Clinics, pharmacies, doctors' offices rarely have the capability to provide themselves with power or water in the event of a disaster.

The transportation system is also vulnerable to many types of natural disaster. In Honduras alone Hurricane Mitch destroyed more than 9000 meters of bridges isolating many communities. The combination of destruction to the transportation and communications sectors had a grave impact on the public health sector's ability to respond to the disaster. Because of the damage surveillance efforts were hampered. Instead of 70% of locations providing surveillance reports on communicable diseases only 30% of locations provided such reports following the disaster. This hampered the ability to respond to any public health emergencies that may have cropped up and probably contributed to the dengue fever outbreak (PAHO 1999).

Conclusion

The public health consequences of natural disasters are complex. Disasters directly impact the health of the population resulting in physical trauma, acute disease, and emotional trauma. In addition, disasters may increase the morbidity and mortality associated with chronic diseases and infectious diseases through the impact on the health care system. How are these ramifications best reduced? As the saying goes, an ounce of prevention is worth a pound of cure. Possibly the greatest factor which would lead to reduced morbidity and mortality as a result of disasters is a strong public health system.

A public health sector which conducts routine surveillance, has good immunisation coverage, maintains adequate environmental control, etc. will be better able to withstand the increase in need following a disaster. The health system, including the medical care system, however must itself be prepared to resist the disaster. Buildings and their contents must protect the health care professionals inside and they must be able to continue to function in the aftermath of a disaster. This necessitates that the health sector undertake major efforts to mitigate damages to itself from potential hazards and prepare to function at increased capacity following the impact of a disaster.

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Authors contact details

Kimberley I. Shoaf, Dr PH
UCLA Center for Public Health and Disaster Relief
Box 951772
Los Angeles, CA 90095-1772

phone: 310 794-6646
fax: 310 794-1805
email: kshoaf@ucla.edu

Steven J. Rottman, MD, FACEP
UCLA School of Public Health
924 Westwood Boulevard
Suite 300, University of California at Los Angeles
Los Angeles, CA 90024
email: rottman@ucla.edu



Announcement

Proposed sessions of the 'Disaster and Social Crisis Research Network' for the 5th European Sociological Association Conference

The 5th European Sociological Association Conference, 'Visions and Divisions: Challenges to European Sociology', will be held in Helsinki, August 28th - September 1st 2001.

The newly recognized by the ESA, 'Disaster and Social Crisis Research Network', plans to organise five regular sessions during the Conference. Sociologists and other Social Scientists who are interested in making a presentation in one of these sessions should submit an abstract of not more than 250 words, no later than January 31, 2001, to the respective session coordinators.

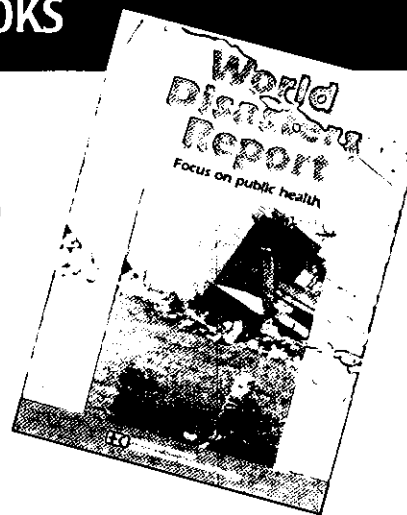
- I. Disasters and Social Crises: Visions and Divisions in American and European Approaches.
- II. Deconstructing Disaster Management: Beyond the Command and Control Model.
- III. The Contributions of Sociology to Disaster Research and Vice Versa.
- IV. Global Accumulation of Capital as a Factor in Social Crises and Complex Disasters.
- V. Disaster and Sociocultural Changes: Changes other than those in the Organization of Civil Protection.

A full version of the conference details can be found on the Disaster and Social Crisis Research Network page:

www.anglia.ac.uk/geography/d&scrn/
(then go to the Helsinki Conference page)

New Books

World Disasters Report 2000 International Federation of Red Cross and Red Crescent Societies



The World Disasters Report is an annual publication of the International Federation of Red Cross and Red Crescent Societies, that analyses trends in natural and man-made disasters around the world, and their effects on the environment and populations. The Report 2000 concentrates on the devastating consequences of disease. While natural disasters like earthquakes attract media attention and donor funds, the so-called silent disasters such as malaria, HIV/AIDS, tuberculosis and many other communicable diseases kill ten times more people. The Report 2000 reveals the following: in 1999 some 80,000 people were killed in natural disaster—on the other hand, infectious diseases killed a staggering 13 million. From AIDS alone 300 people die every single hour. The Report also explains that, while they claim the most lives, infectious diseases are also the most preventable disasters.

Providing comprehensive, up to date and expert analysis of disaster and emergency trends, the World Disasters Report 2000 is an essential tool for all researchers, aid workers, journalists and academics interested in aid and humanitarian action.

Price: \$ 39.95 plus postage (GST included)
Available from the Australian Red Cross
155 Pelham St Carlton VIC 3053
fax: 03 9348 2513 Attn: Sharon Pimm
email: spimm@nat.redcross.org.au

Letter to the Editor

Efforts to reduce the stress exposure risks to emergency personnel in operational situations are no longer optional. Legal requirements and proactive risk management initiatives have insisted on approaches which recognise the duty of care required. John Lunn's article (AJEM, Winter 2000) provides a good overview of factors such as emergency worker selection, appropriate management policies and the issues relating to work schedules and fatigue factors.

This article has also queried the usefulness of stress debriefing. I was pleased to note the author discussed the importance of not having stress debriefing as a stand alone initiative. Many critics fail to hear this message and isolate the debriefing protocol from other support activities, when key recommendations relating to this area advocate that stress debriefing be used as a part of an overall Critical Incident Stress Management initiative.

The author cites a study by Bisson et al, as being critical of stress debriefing

as an effective post trauma technique. I believe this research has no relevance to the needs of emergency personnel post incident. The Bisson study used a technique, originally intended as a group support strategy with individuals. I question just how much we can infer from the individual debriefing of accident victims to the group debriefings of trained emergency workers? Are we comparing apples with oranges?

Criticisms of stress debriefing continually fail to address a number of questions. What was the debriefing protocol used? How were the facilitator's trained? Were the facilitators matched for experience, methodology and consistency of approach? How much control did the study have over when a debriefing took place? This is important because the timing factor seems to be a major issue.

Another major issue is the use of the generic term 'debriefing'. Most of the critical research has ignored definitions of the methodology, and provided

results which have led to the criticism of all forms of debriefing. If all references to the protocols and procedures followed were avoided, one could also use the same approach to demonstrate that counselling doesn't work, then extend the results to all forms of counselling in all circumstances. Having facilitated many stress debriefings following critical incidents, for emergency workers, security guards, bank employees, miners and offshore rig workers, I believe strongly in their value when the following conditions apply:

- they are used appropriately
- they are part of an overall support initiative
- they are facilitated by someone who knows what they're doing
- they follow an appropriate protocol
- they are sanctioned and endorsed by the organisation.

Michael Tunnecliffe
Clinical Psychologist

Disaster Events Calendar

January 2-5, 2001
Plymouth, U.K

Coping with Catastrophe: Innovation and Integration

Royal Geographical Society/Institute of British Geographers

'This session of the annual RGS/IBG conference will explore contemporary issues in the construction and distribution of risk and vulnerability in urban and rural contexts. Papers draw from physical as well as human geographical traditions and especially from interdisciplinary approaches and address issues of integration and innovation in methods or in the presentation of findings.'

Contact:

Mark Pelling
Department of Geography
University of Liverpool
email: pelling@liverpool.ac.uk
or Stephan Harrison
Department of Geography
Coventry University
email: s.harrison@coventry.ac.uk

February 12-16, 2001
Auckland, New Zealand
Cities on Volcanoes 2

Organisers:

Institute of Geological and Nuclear Sciences,
Auckland Regional Council, Massey
University, University of Auckland, and the
International Association of Volcanology and
Chemistry of the Earth's Interior.

Contact:

Secretary
Cities on Volcanoes 2
Wairakei Research Centre
Private Bag 2000
Aupo, New Zealand
phone: 64 7 374 8211
fax: 64-7-374 8199
email: citiesonvolc2@gns.cri.nz
www.gns.cri.nz/news/conferences/cities.html

March 19-April 6, 2001
Melbourne, Australia

HELP 2000 — Health Emergencies in Large Populations Course

Sponsors:

International Committee of the Red Cross
(ICRC), American Red Cross, and Pan American
Health Organization.

Contact:

International Committee of the Red Cross
GEN_SAN Help Courses, 19, avenue de la Paix

1202 Geneva, Switzerland
phone: 41 22 730 28 10
fax: 41 22 733 96 74
email: pperrin.gva@icrc.org
email: azogopou@nat.redcross.org.au
www.icrc.org

April 24-25, 2001
Boston, Massachusetts

CPM (Contingency Planning and Management) 2001.

Sponsor:

Contingency Planning and Management
Magazine
Contact Alicia LoVerso
Conference Coordinator
WPC Expositions
84 Park Avenue
Flemington, NJ 08822
phone: 908 788 0343 (ext. 154)
Fax: 908 788 9381
www.ContingencyPlanExpo.com

May 9-12, 2001
Lyon, France

12th World Congress on Disaster Medicine.

Organiser:

World Association for Disaster and Emergency
Medicine

Disaster Events Calendar

Contact:
WDCEM 2001
1 rue de la Banniere
69003 Lyon, France
Fax: 33 04 72 60 92 89
email: wcdem2001@aol.com
www.wcdem2001.org, or
http://pdm.medicine.wisc.edu/pdmcalendar.html

May 21-24, 2001
San Diego, California

2001 Technology Partnerships for Emergency Management Workshop and Exhibition

Sponsors:
Federal Emergency Management Agency and others.

Contact:
Dr. Brenda-Lee Karasik
phone: 619 553 2101
email: brenda@spawar.navy.mil
Mr. Dale Gurley
phone: 619 553-5630
email: gurley@spawar.navy.mil
www.foundation.sdsu.edu/technologysolutions.

June 3-8, 2001
Charlotte, North Carolina, USA

Association of State Floodplain Managers (ASFPM) 25th National Conference

The Association of State Floodplain Managers is an organisation of professionals involved in floodplain management, flood hazard mitigation, the National Flood Insurance Program, and flood preparedness, warning and recovery. The group has become a respected voice in floodplain management practice and policy in the United States because it represents the flood hazard specialists of local, state and federal government, the research community, the insurance industry, and the fields of engineering, hydrologic forecasting, emergency response, water resources, and others.

Contact:
ASFPM
2809 Fish Hatchery Road
Suite 204
Madison, WI 53713-3120, USA
phone: 608 274 0123
fax: 608 274 0696
email: asfpm@floods.org
www.floods.org/conf-aus.htm

June 17-22, 2001
Newport Beach, California

Eighth International Conference on Structural Safety and Reliability (ICOSSAR '01) (Includes sessions on hazards analysis, earthquake engineering, wind engineering, and other hazards-related issues.)

Organised by:
International Association for Structural Safety and Reliability.

Contact:
ICOSSAR '01 Secretariat
University of Colorado

College of Engineering and Applied Science
Campus Box 422
Boulder, CO, 80309-0422 USA
phone: 303 492 7006
fax: 303 492 0353
email: corotis@colorado.edu -or- icossar@usc.edu
www.colorado.edu/engineering/ICOSSAR

Mid-2001
Washington, DC

Second World Congress on Natural Disaster Reduction

Sponsor:
American Society of Civil Engineers (ASCE)
This meeting is in the formative stages

Contact:
Walter Hays
ASCE
1801 Alexander Bell Drive
Reston, VA 20191
phone: 703 295 6054
email: whays@asce.org

July 2-6, 2001
Eindhoven, The Netherlands

Third European and African Conference on Wind Engineering

Contact:
3EACWE Congress Office
Eindhoven University of Technology
P.O. Box 513
5600 MB Eindhoven
The Netherlands
fax: 31 40-2458195
email: congressoffice@tue.nl
www.bwk.tue.nl/bwk/events/3eacwe

August 7-10, 2001
Seattle, Washington

International Tsunami Symposium 2001 (ITS 2001)

Submit abstracts on-line or by e-mail not later than September 1, 2000.
See www.pmel.noaa.gov/its2001 for complete instructions and additional information, or contact E.N. Bernard
NOAA/PMEL
7600 Sand Point Way N.E.
Seattle, WA 98115-6349
phone: 206 526-6800
fax: 206 526-4576
email: bernard@pmel.noaa.gov

August 19-24, 2001
Washington, D.C.

First World Congress on Disaster Reduction

Sponsors:
American Society of Civil Engineers (ASCE) and others.

Contact:
Walter Hays ASCE
1801 Alexander Bell Drive
Reston, VA 20191
phone: 703 295-6054
email: whays@asce.org; or

Michael Cassaro ASCE
e-mail: macass@aye.net

August 28-September 1, 2001
Helsinki, Finland

Fifth European Sociological Association Conference

This meeting will incorporate several proposed sessions of the 'Disaster and Social Crisis Research Network' (see announcement p. 63). Sociologists and other social scientists who are interested in making a presentation in one of these sessions should submit an abstract of not more than 250 words, no later than January 31, 2001, to the respective session coordinators. Further information available at: www.anglia.ac.uk/geography/d&scrn/

September 4-6, 2001
Malaga, Spain

Third International Symposium on Earthquake Resistant Engineering Structures (ERES 2001)

Contact:
Susan Hanley
Conference Secretariat
Wessex Institute of Technology
Ashurst Lodge
Ashurst, Southampton, SO40 7AA, U.K.
phone: 44 0 238 029 3223
fax: 44 0 238 029 2853
email: shanley@wessex.ac.uk
www.wessex.ac.uk/conferences

September 9-12, 2001
Philadelphia, Pennsylvania

International Public Works Congress and Exposition

Includes educational sessions on emergency management issues.

Contact:
American Public Works Association
2345 Grand Boulevard
Suite 500
Kansas City, MO 64108-2641
phone: 816 472 6100
fax: 816 472 1610

September 10-14, 2001
Brno, Czechia

Fourth Moravian Geographical Conference on Nature and Society in Regional Context

Organisers:
Institute of Geonics, Czech Academy of Sciences
'Disasters and Their Natural and Social Consequences' is one of the conference topics.

Contact:
Antonin Vaishar
Institute of Geonics
P.O. Box 23
613 00 Brno, Czechia
fax: 4205 578031
email: vaishar@geonika.cz
or visit the website at: www.geonika.cz, password CONGEO Conference

